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THIRTIETH CONGRESS—FIRST SESSION.

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HOUSE OF REPRESENTATIVES.

ANNUAL REPORT

OF THE

COMMISSIONER OF PATENTS,

FOR THE YEAR 1847.

March 3, 1848.
Referred to the Committee on Patents.

WASHINGTON:
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1848.

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REPORT

OF

THE COMMISSIONER OF PATENTS.

Patent Office, *January*, 1848.

Sir: In compliance with the provisions of the act of Congress, entitled "An act in addition to the act to promote the progress of science and the useful arts," approved March 3, 1847, the undersigned has the honor to submit his annual report.

During the year ending December 31, 1847, the whole number of applications for patents, is fifteen hundred and thirty-one. The whole number of caveats filed during the same period is five hundred and thirty-three.

The number of patents issued in 1847 is five hundred and seventy-two, including fourteen re-issues, three additional improvements, and sixty designs; classified and alphabetical lists of which, with the names of the patentees, are annexed, marked K and L. Three disclaimers were, during the same time, entered.

Within the same period, five hundred and eighty patents have expired; a list of which is annexed, marked M.

There were during the year, nine applications to extend patents about to expire, six of which were rejected and three granted by the board, established by the act of July 4th, 1836, to hear and determine that class of applications.

The claims embraced in the respective patents issued during the year 1847, are also annexed, marked P.

The number of applications for patents examined and rejected during the year 1847, is five hundred and fifty-seven; being very nearly as many as were granted. Many of the rejected cases may, however, be re-considered, and perhaps, upon farther examination, passed, and patents issued for the inventions or improvements claimed by the applicants.

The receipts of the office during the year 1847, including duties and fees, paid in on applications for patents, caveats, re-issues, disclaimers, additional improvements, extensions and for copies, amount, in the whole, to $63,111 19; of which sum, $8,008 43 have been repaid on applications withdrawn, and for money paid in by mistake, as per statement marked A.

The expenses of the office during the year 1847, are as follows, viz: For salaries $16,350; temporary clerks, $6,937 57; contingent expenses, $8,657 77; compensation of the chief justice of the District of Columbia, sitting on appeals from the commissioner of patents, $100; library, $1,049 58; agricultural statistics, $465; amounting, in the whole, to the sum of $33,559 92, as per statement marked B.

There was also expended during the last year, under the act of March 3, 1837, for the restoration of records and drawings, the sum of $310, as per statement marked C.

The aggregate of expenditures under the different heads above enumerated, is $41,878 35; leaving a balance, to be carried to the credit of the Patent Fund, of $21,232 84.

On the first day of January, 1847, the amount of money in the treasury, to the credit of the Patent Fund, was $186,565 14; which, with the balance paid in during the year 1847, will, on the first day of January, 1848, amount to the sum of $207,797 98.

It will be seen, that the surplus carried to the credit of the Patent Fund, during the last year, is much greater than that of any former year. This arises from two causes, first, the great increase of applications for patents and caveats over any former year; and secondly, the inability to examine and decide upon applications in a reasonable time after they have been filed in the office, growing out of the inadequacy of the examining force of the office, causing a comparatively less number of withdrawals, and a comparatively less amount of expenditure for copying and recording patents. If Congress should authorise an increase of the scientific corps, so imperatively needed, the number of withdrawals will be greater and the other expenses of the office will be increased, and thus the balance next year, will be, in all probability, much smaller than it is this year.

All moneys paid into the treasury on account of the Patent Office, are set apart by the ninth section of the act of July 4, 1836, and the fourteenth section of the act of March 3, 1837, for the benefit of the Patent Office, and denominated the Patent Fund; out of which all expenditures provided by existing laws are to be paid, the Patent Fund being especially appropriated for that purpose. By thus establishing the Patent Fund, and appropriating it to the special object of defraying all expenditures of the Patent Office authorized by law, Congress expressed its intention to constitute the office upon the principle of a self-sustaining institution which is to exist upon its own revenues, and not depend for support upon the general treasury. Thus far, it gives me pleasure to say, the intention of Congress has been fully carried out, the office having not only paid its own expenses from its own revenues, but it has accumulated a comparatively large balance in the treasury to its credit. With the exception of the cost of erecting the present Patent Office building, to which the office contributed $108,000, from its own funds, it has never been a charge upon the treasury.

Nearly all of its revenues are derived from inventors. It is sustained by their contributions; its services are appropriated to the promotion of their particular interests, although rendered to all other interests when required; and it may, therefore, truly be regarded as the head and representative of the inventive genius and the industrial arts of the country.

The annual reports of the two principal examiners, addressed to the undersigned, giving a view of the inventions and improvements which have passed their respective desks, are annexed, marked D and E.

To these two important reports attention is particularly called. They give an interesting summary of the scientific operations of the office during the past year, thus presenting in a small space the most conclusive and gratifying proofs of the progress of our countrymen in the improvement of the useful arts. It will be seen from the two papers referred to, that the year just past has been fruitful of inventions of a most important and valuable character, if they have not been of that novel and brilliant description which sometimes surprise and startle the world, at the same time benefiting it by their great utility.

The peculiar circumstances of society in this country growing out of its settlement—very recent when compared with the age of other civilized portions of the earth, and imposing the necessity of subjugating the forest, of smoothing down the rugged face of nature, and of planting upon its bosom the arts of industry, which have rapidly germinated and developed themselves into great and important interests, now flourishing with a vigor and energy which enable them to become the formidable rivals of similar interests of older nations—have tended to stimulate the inventive genius of our people to the production and improvement of machines and processes of an utilitarian and labor saving character, rather than to the pursuit of more scientific discovery. Hence, while we may be behind other countries in the discovery and development of scientific principles, we are probably equal with, if not in advance of them, in their application to the useful purposes of life. But, if the genius of our countrymen is not now so much absorbed in the investigation of abstract science as that of the citizens of older and more opulent countries, the circumstance of society so rapidly improving by the steady tide of prosperity which sets in our favor, will soon place us in a condition to contribute our share to the sum of knowledge which the combined genius and labors of the learned of all civilized nations annually bestow upon mankind.

It will also be seen, on reference to the reports of the Examiners above referred to, that the labors of those two officers are of a very varied and complicated character, embracing in their range the whole field of invention, and requiring a thorough knowledge of every branch of science, as well as the state, past and present, of the arts in all countries. From this fact the talents and attainments requisite for the able discharge of the duties appertaining to their desks may be readily inferred. It may be safely assumed that there is no office in the Government, the duties of which are of a scientific nature, which requires more mental capacity, or more close and intense application, than that of Examiner of Patents. It would, therefore, be reasonable to suppose that there would be attached to that office, a salary commensurate with its duties and the talent and attainment which it requires. But, so far from that being the case, the Examiners now receive but $1500 per annum, a sum paltry in comparison with the abilities and qualifications which they must possess, very much below the salaries paid to persons filling stations requiring scientific attainments of an inferior grade, and only equal to the common clerkships in the offices of the Capitol, and the weighers, measurers, and guagers of the Custom Houses. My predecessor in his last report, called the attention of Congress to the inadequate salaries allowed to the Examiners in this office, and respectfully recommended an addition to be made to that branch of its service. In the two reports which I have had the honor to submit to Congress, I have expressed my concurrence in the recommendations of my predecessor; and from the action which has already taken place in the two branches of that honorable body, I am encouraged to hope that it will not be long before justice is done to that valuable class of officers, whose merits and claims I now again commend to its favorable consideration.

The necessities and embarrassments under which the office is now laboring on account of the want of an adequate scientific force to perform its greatly increased business, impose upon me the duty of earnestly but respectfully soliciting the prompt action of Congress for its relief. A brief statement of facts will show the absolute necessity of an addition to its scientific corps.

By the act of July 4, 1836, reorganizing the Patent Office, the Commissioner of Patents was allowed but a single Examiner. By the act of March 3, 1837, he was authorized to appoint another Examiner. And by the act of March 3, 1839, he was authorized to appoint two Assistant Examiners. Thus, within a period of less than three years from the reorganization of the office, there were two principal and two assistant examiners provided for by law; since which time no addition has been made, because none has been authorized.

In 1840, the first entire year after the last addition to the examining corps was provided for, the number of applications for patents was 765, the number of caveats filed was 228, and the number of patents granted was 475.

During the year 1847, the number of applications for patents was 1,531, the number of caveats filed was 533, the number of patents granted was 572, and the number of applications rejected was 557.

Thus it appears that the business of the office has increased *one hundred per cent.* since the last addition was made to the examining corps in 1839.

In the year 1844, the year preceding my appointment to the office of Commissioner, the number of applications for patents was 1,045, and the caveats filed 380. In 1845, the number of applications was 1,246, caveats 452. In 1846, the number of applications was 1,272, caveats 448. And in 1847, as before stated, the number of applications was 1,531, caveats 572. Thus since my appointment to the office of Commissioner of Patents, the business of the office has increased in the ratio of 33 per cent.

During the five years commencing with 1840, and ending with 1844, embracing the five last years preceding my appointment to the office of Commissioner, the amount paid into the treasury to the credit of the Patent Fund was $25,200 43. During the three years since my appointment, the amount paid into the treasury is $37,018 72, showing an increase of surplus over expenditures in a much greater ratio than 33 per cent.

In 1844, the business of the office was quite equal to the ability of the examining corps to perform it, and in anticipation of the early necessity of an addition to that branch of the service of the office, my predecessor in his last annual report suggested that such addition would soon be required. During the last three years it has far transcended the capacity of the examiners to do it as it should be done, or to do it at all, and hence it has accumulated until it has produced serious embarrassment to the office, and very great injury to the interests of the inventors. The office is now seven or eight months in arrear of its business, and is daily becoming more and more embarrassed.

In view of the increasing accumulation of business and the consequent embarrassment of the office, I called the attention of Congress to its condition and recommended an immediate addition to its scientific corps in my report of January, 1846. Before the close of the session of 1845–6, anticipating from the great amount of more important business then pending before Congress, that the necessities of the Patent Office might be overlooked, I again called the attention of Congress to the subject by a letter addressed to the Committee on Patents of the Senate, dated June 10, 1846. Congress, however, adjourned, without taking any action for the relief of the office.

In my report of January, 1847, I again repeated my request for an addition to the examining corps, pressing in urgent but respectful terms the embarrassments of the office growing out of its increase of business, and the *absolute necessity* of the adoption of suitable provisions for its relief. The session being about to close, without, as I apprehended, any action for the relief of the office, I again brought its embarrassments and necessities before both houses of Congress by duplicate letters addressed to their respective committees having the interests of the Patent Office in charge, dated February 17th, 1847. At that session a bill passed the House of Representatives providing, among other things, for an addition to the examining corps; but failed in the Senate for want of sufficient time to act upon it.

The embarrassments of the office continuing, and greatly increasing in consequence of its rapidly accumulating business and the want of an adequate force to execute it, at an early day after the commencement of the present session, and in anticipation of my annual report, I again by a duplicate letter addressed to the Committees on Patents of the House and Senate, dated December, 1847, respectfully but earnestly requested the interposition of Congress for the relief of the office, by providing for an adequate increase of its examining corps.

Thus have I, in five separate communications to Congress and its appropriate Committees within the last two years, made full expositions of the embarrassed condition of this office growing out of its greatly increased and increasing business, and the inadequacy of its force to perform its duties.

In view of these facts, I am confident that the Patent Office cannot be held responsible for the embarrassments and delays which exist in one of the branches of its service. I am conscious that the inventors by whose contributions this important institution is sustained, have grievous cause of complaint on account of the disappointments and injuries which they suffer from the delays which their business is compelled to encounter in the Patent Office, but I am confident their enlightened liberality will appreciate the earnest and persevering efforts which have been made by the undersigned to remove the just causes of their complaints, and that they will patiently wait the action of Congress for their relief, which, it is gratifying to know, may be confidently anticipated before the close of the present session.

In my former reports I have recommended a change in some of the features of the patent law as it now exists. For the nature of those recommendations, and the reasons on which they are founded, I would respectfully refer to the annual reports of this office, for 1845 and 1846. In my judgment the changes proposed are necessary to give adequate security to that valuable and meritorious class of our citizens engaged in inventive pursuits. As the law now is, the remedies which it affords to patentees are, in most cases, inadequate to the protection of their rights and the prevention of infringement upon them by that unscrupulous and unprincipled class of persons, who make it a practice wilfully to depredate upon patent rights, and who, from the basely criminal character of the offence which they commit, are stigmatized by the application to them of the infamous epithet of *pirate*. Certainly, adequate protection should be given to the honest inventor who devotes his substance and his incessant toil for the benefit of society, against the freebooters who invade without scruple his property, which, to him, is more sacred and invaluable, because it is the cherished creation of his own genius.

Unfortunately, property in patent rights is not generally looked upon by society in the same light in which property existing in other forms is regarded. This results, perhaps, from the fact that many useless inventions have been patented, by which the public have been imposed upon and deceived. If such be the fact, it does not in any respect affect the general principle upon which not only property in inventions, but all rights of property, are founded.

Nobody doubts the right of property which a man has in his lands, houses or common chattels; and all agree that he has a right to claim from the government under which he lives, protection in the enjoyment of his property. Nay, so careful is the government itself of the sacred right which every citizen has in his own property, that it never takes it from him without giving him an adequate compensation for it. The necessities of the government are, in certain emergencies, supreme over the rights of its citizens, and, by virtue of its right of eminent domain, it can take the property of its citizens for the public use. But in all civilized countries, in which the immutable principles of morality and justice prevail, governments never take the property of their citizens and appropriate it to their own use, without first giving an adequate compensation for it. This sacred immunity from unjust invasion of private rights, even by the sovereign power of the state, is secured in all the constitutions, national and state, of this confederacy. They recognise the inviolability of private property, and provide that it shall be taken only for the public use, and then only upon the condition of an adequate indemnity to be first awarded and paid.

It is upon this very principle that the law is founded which provides that property in patent rights shall, on certain conditions, pass from the inventor into the possession of the public, after the lapse of a fixed term of years. Our whole patent system, having its origin in the constitution itself, is built upon the recognition of this absolute right of the inventor to the exclusive enjoyment of the productions of his combined genius, labor and capital. It regards such a description of property as the law does all other descriptions, as sacred and inviolable, in the possession and enjoyment of which the owner has a right to claim protection. But it subjects it, as it does all other descriptions of property, to the necessities and uses of the body politic, on the return of a fair and just equivalent.

The inventor having the sole control over his invention, may use it in secret if he pleases. He is not bound to disclose it to the public, and the public has no right to its use except by purchase, unless he should voluntarily surrender it. If the community should get the possession of an invention in any other way, it could only have surreptitiously obtained it. Hence, in order to induce him to disclose it, and to permit the public ultimately to enjoy it in common with himself, the government, representing the community, offers him the exclusive enjoyment of his property during a term which it supposes will be sufficient to enable him to obtain from its sale to others, an ample remuneration for his time and expenses in producing it. Therefore, upon strict principles of justice and equity, he is entitled to complete protection in the enjoyment of his rights during the term limited, and if he is not thus protected, the contract is in effect broken on the part of the government; and if such a contract, expressed or implied, existed between man and man, it would, if thus broken, be declared a nullity, and the inventor would be remitted to the enjoyment of his original rights, or exemplary damages by way of compensation would be given to him. And this system is just and equitable to the inventor as well as to society.

There are ample reasons why private and exclusive property in inventions should cease, and the inventions themselves become a part of the common property of the national body politic. If it were not the case, but, on the contrary, if the inventor and his representatives were to be protected in the perpetual enjoyment of his discovery, improvements in a great measure would cease, and advancement in the arts and manufactures would be greatly retarded, to the detriment of the best interests of society.

Therefore it is necessary and just that discoveries, inventions, and improvements in science and the useful arts, should, under proper circumstances, be taken from the inventor and appropriated to the public use, upon the condition that the proprietor shall be justly remunerated for this surrender of his private rights for the benefit of the paramount interests of the community. Hence, while recognising his absolute right of property in his invention, and promising him protection in the enjoyment of it, as other citizens are protected in the enjoyment of their property, subject always to the superior necessities of the public interest, the patent system provides that the patentee shall enjoy the exclusive monopoly in the use and sale of his invention for the term of fourteen years. It supposes that he will be adequately remunerated for his invention in that space of time, and that at the end of it, it will be just and equitable that his property in his invention should cease, and that it should pass into general use. It adopts this mode of compensating him for the appropriation of his private rights to the public use, instead of appraising the value of his invention and awarding to him a specific sum in money for it, as is done in the public appropriation of other descriptions of property. And there can be no doubt that this is the best and wisest method that has yet been devised to compensate the inventor; best for him, and best for the public. As his compensation depends upon his own efforts, he makes every exertion to perfect his invention, and introduce it into general use, during the term to which his exclusive right is limited. Thus does this wise policy benefit both the inventor and society.

But while his exclusive property in his invention exists, it must be conceded that the inventor has a right to demand of the Government, the most ample security and protection in its enjoyment. This security and protection he does not, under our present imperfect system, enjoy. On the contrary, the difficulty and expense, and the absolute impossibility, in some cases, of vindicating his rights, have rendered the present laws enacted for his protection, almost absolute nullities. To remedy this imperfection in the existing system, is the object of the amendments of the patent laws, proposed in the two former reports of the undersigned.

While the steam engine, most potent of all the creations of genius, is daily coursing before our eyes, wafting as upon the wings of the wind its precious freight of human life, and its countless treasures of industry and commerce; while the mysterious telegraph speeds our thoughts with the swiftness of lightning which is its obedient and trusty messenger; while magnificent manufactories stud our land, stunning, but delighting us with the never-ceasing movement of their wonder-working machinery, it seems unnecessary to remark upon the incalculable value of the labors of the inventor and his claims upon society for protection in the enjoyment of his just rights. And, sooner or later, the undersigned is confident they will be fully recognised and protected by the enlightened legislators of a great republic, whose progress has been so much accelerated by their genius and enterprise.

In my last report, I had the honor to suggest the propriety of reducing the duties now exacted from foreign applicants for patents to the same rate of duty required of American citizens, when it should appear that the governments to which such foreign applicants belonged, had made corresponding reductions in the charges and fees now imposed upon the applications of citizens of this country for patents granted within their respective jurisdictions.

Upon more mature reflection, I have arrived at the conclusion that the interests of this country would be best promoted by reducing the duties on all foreign applications to the same amount now required of its own citizens.

In the first place, no such invidious distinction is made by other governments between the application of their own subjects, and those of American citizens. It is indeed true, that the duties charged for patents by most of the governments of Europe, are very high compared with those charged by the government of the United States upon its own citizens. But the same duties are charged by foreign governments on all alike, whether native or foreign, without any discrimination in favor of one or the other. This policy is liberal and enlightened, and worthy of emulation by a great and generous nation; a characteristic which, it is hoped, may be always justly claimed for the United States.

But, if high and magnanimous sentiments of justice are not sufficient to induce the repeal of the unjust discriminations which our laws make and enforce against foreign inventors, and it is necessary to appeal to the lower and less respectable considerations of self-interest, it may, I think, be clearly shown that this country would derive from it a benefit infinitely transcending the paltry revenue which it derives from the few foreign inventions which are patented here. The great expense which attends the procuring of patents in most of the governments of Europe, and particularly in Great Britain, prevents the patenting of many valuable inventions which are never voluntarily made public, but are used in secret at home, and, of course, rarely become known in other countries. If our laws permitted the patenting of such inventions on the same terms on which patents are granted to American citizens, many of those inventions would find their way into use in this country. More of the valuable inventions which are deemed worthy of patents abroad, even at the great expense on which they can only be obtained, would be patented and introduced into use here. The great extent of our territory, its growing population, and its rapid increase of wealth, offer promises of reward to the foreign inventor which can be found in no other country. To induce him to come here, we have only to place him upon the same footing, and to grant to him the same privileges, which our own countrymen enjoy. We should, by such a wise policy, increase our means of emulating and rivaling other nations in the arts and manufactures.

Nor would it be injurious to our own citizens engaged in inventive pursuits, for it fortunately happens, that there is no competition or conflict of interest among inventors, each exploring a new and untried field of experiment, and each aiming to discover principles and combinations which have never been before known.

During the year 1847, there were but twenty applications for patents from foreigners, upon which the aggregate sum of $8,800 was paid into the treasury. Of course, if they had each paid but the sum of $30, the fee charged upon applications of citizens, the sum would have been but $600. To supply the deficiency in the revenues of the office, which will be occasioned by the change proposed in reference to foreign inventions, it would be necessary to look to other sources than those at present provided. The sum of $3,000, could be obtained by authorizing the charge of a moderate fee for recording assignments, a service which the office now performs, without compensation, for a class of persons a great majority of whom are the last to be exempted from contributing to its support. A much larger sum might be obtained by a repeal of that provision of the law which authorizes a repayment of twenty dollars on the withdrawal of an application for a patent that has been rejected, which would operate beneficially to the Patent Office and to the public, by preventing many applications for inventions of doubtful utility and value. A very considerable increase of foreign applications might also be reasonably anticipated, which would contribute to supply the deficiency occasioned by a reduction of the present duty charged upon such applications. Thus, from all these additional sources of revenue, the office would not only sustain itself, but would be able to add to its vigor and efficiency of action as the increase of its business might require.

It is hoped that these considerations may induce Congress to deliberate, and favorably to act upon the proposition for a change of the existing law, in relation to foreign inventions, which is now respectfully submitted.

The rapidly increasing number of applications for patents afford convincing proof of the wisdom and sound policy of the present patent system of the United States. The very low terms on which patents can be obtained in this country, when compared with the cost of obtaining them under most other governments, encourage attempts at discovery and improvement, not only in the higher branches of the arts, but also in the most humble. Hence, the inventive mind of the country is busily at work in all its various grades, daily bringing forth valuable improvements and contributing to the means of comfort and enjoyment in all the ranks and conditions of social life. This office, standing in a position from which it can contemplate the whole field of discovery, can mark, from year to year, the great progress of our countrymen in the sciences and arts, and their application to the varied industrial pursuits in which our people are engaged.

Nor is the genius of our countrymen confined to the invention and improvement of valuable machines and processes of manufacture. Stimulated by our present imperfect law of designs, their attention and efforts are turned to the production of the beautiful in form as well as the valuable in use. This result is daily becoming more and more visible in numerous articles and manufactured fabrics, the designs and patterns of which are now patented under the law of designs. Hence, it encourages the hope that our countrymen will soon be able to compete with the ingenious artizans of other countries, in those fabrics and manufactures which not only require a high state of perfection in machinery, but also the production of those beautiful and pleasing forms, figures and designs which adapt and recommend certain kinds of manufactured articles and fabrics to the taste and fancy of the consuming portion of the community.

It will be recollected that no appropriation was made by Congress for the Report upon the state of Agriculture, for the year 1846, and none accordingly was made. At the last session the usual appropriation for the collection of agricultural statistics was made, which duty has been performed, and its results are contained in the paper annexed, marked F.

On account of the interruption of the agricultural report in 1846, and the consequent suspension of the investigations in which this office was then engaged, and the abandonment of all the efforts which it was then making, and means which it had in its possession to obtain information, the undersigned has had much difficulty in resuming this branch of his duties. Yet, it is believed that the estimates of the crops for 1847, now submitted, will approximate very nearly to the real quantities produced. If they should be defective in any respect, as they must of course be, perfect accuracy being unattainable, they will be found to err on the favorable side: that is to say, they will be found to be below the actual results.

On examining the tabular estimates annexed to the report, it will be seen that, while some of the crops inferior in value and amount, have remained nearly stationary, or perhaps slightly diminished, the great staple products of agriculture have steadily increased; thus furnishing, as usual, ample provision for domestic consumption, and an additional surplus for exportation. It will be perceived that the corn and sugar crops have largely increased since the last estimates of this office were submitted to Congress, which was for 1845. The wheat, cotton, potatoe, rice, tobacco, and oats crops, have not increased so rapidly, although they exhibit a very satisfactory addition to their aggregate amounts. On the whole, the husbandman has reason for gratitude to Providence for the additional abundance which it has during the past year beneficently bestowed upon him.

The season which has just passed has been generally favorable to the growth and maturing of the maize crop, but not so favorable for wheat. The former crop requires hot and comparatively dry weather, while a more humid atmosphere, and cooler temperature are more favorable to the growth and development of wheat. Therefore when the season is less favorable for one crop it is more so for the other. And thus, while one crop may partially fail from causes adverse to its growth, the other is sure to be benefitted and increased by the very same causes; thereby securing ample provision against famine or dearth, unless sent by special visitation of Providence.

It should not, however, be forgotten that one great source of supply for human food has been mysteriously and alarmingly smitten. For some years the potatoe has been visited with a malady, the cause and remedy of which, it has baffled the sagacity of man to discover. Although almost innumerable theories have been advanced to account for the plague which has seized upon the potatoe, the secret still remains hidden from the scrutiny of human intelligence. The disease progresses both in this country and in Europe, threatening the entire destruction of that important article of food for man and beast, and when and where its destructive course shall be stayed, belongs not to human wisdom or human effort to determine. While, from the abundance of other articles of sustenance, the partial loss of the potatoe crop has caused no suffering, and but little embarrassment, in this country, in other countries, its destruction has brought in its train a frightful amount of starvation and distress. The deprivation and suffering which it has inflicted on the people of other countries, have revealed the great resources of this, and demonstrated its capacity to supply the wants and demands of other nations to any extent which can be reasonably anticipated. It was, indeed, a spectacle grateful to humanity, and sublime to contemplate, to see our fertile and prolific country opening its rich stores of agricultural products to feed the famishing millions of other nations, and to arrest the strides of appalling and inexorable famine which was sweeping them by thousands to the grave; selling to those who had the means of purchasing, and generously giving, without money or price, to those who had not.

The quantity of grain of all kinds estimated in bushels, exported during the commercial year ending August 31, 1847, was 41,273,998 bushels.

Of this quantity, 19,768,579 bushels was wheat, and 20,690,664 bushels was Indian corn; the remainder being rye, barley, and oats. And yet this large quantity sent to foreign countries, did not exhaust our surplus products by millions of bushels. On a tour through several of the States bordering on the great western lakes, during the last summer, the undersigned found the depots of grain, the remains of the crops of 1846, filled to overflowing, and all the avenues of transportation choked up with the immense quantities which were pouring through them to the Atlantic coast to seek markets abroad. It will not exceed the truth to say that the surplus of grain in this country, and particularly of maize, is sufficient to meet any demand which all the corn purchasing countries of Europe combined can make upon us under any probable circumstances. The limits of supply beyond our own consumption, are, from the smallest quantity up to two hundred millions of bushels, if demanded by the wants of foreign nations. The only difficulties to be encountered, would be the inadequate means of transportation from the interior to the coast, and ships to carry our surplus product across the Atlantic. Already the wheat crop equals 114,000,000 bushels, and the maize crop about 540,000,000. The former could, in the course of two or three years, be much increased, and the latter could be increased to the amount of more than 100,000,000 bushels, if the foreign demand should be sufficient to induce so great an expansion of that branch of agricultural production.

The quantity of grain imported into Great Britain in 1847, was 10,840,000 imperial quarters, or 86,720,000 bushels. The exports of grain from this country during the same period, nearly equalled one-half of that amount, and most of it was carried to Great Britain and her dependencies. If returns, which are daily expected from Europe, shall be received in season, a full exposition of the corn trade between this country and that portion of the world, together with an estimate of the probable demands of Europe during the present year, will be made in one of the appendixes to this report.

An estimate of the value of the principal crops produced in the United States during the year 1847, will also be appended.

In surveying the agricultural productions of the Union, we are not only struck with their abundance, but with their great variety and value. Its territorial domain extends from the frigid regions of the north to the genial climate of the tropics, affording almost every variety of temperature, and every kind of grain and vegetable. In the north we have rich and abundant pasturage, giving forth the valuable products of the flock and dairy; in the middle and western regions of the Union, corn in all its varieties is produced in superabundant quantities; and in the south, rice, cotton and sugar grow luxuriantly; and nearly all in sufficient quantities to supply our domestic consumption, and furnish large surpluses for exportation, thus furnishing nearly all the value as well as bulk of our foreign commerce. When contemplating the extent and the value of its products, the number of persons engaged, and the capital employed, the agriculturist may well believe that agriculture is the great transcendent interest of the Union, upon which all other interests are dependent.

And he has equal reason to console himself with the honorable character and exalted dignity of the pursuit in which he is engaged. No occupation offers a greater field for experiment, and for the application of science directed by sound judgment. Experience has proved that every grain, vegetable, and fruit, is susceptible of improvement by scientific cultivation. Science and skill have converted the potatoe from a half poisonous root to a valuable article of human food. They have wrought the same magic transformations upon the apple, peach, and many other fruits and vegetables. Science investigates the nature of soils and manures, and developes the elements of plants, thus pointing out the means by which soil, manure, and plant may be adapted to each other and more abundantly reward the labor and skill of the husbandman. And to crown all, genius stoops from its lofty flight to lessen the burthen of his toil, and mitigate the severity of his labors, by conferring upon him useful implements and valuable machines. Truly may agriculture be called the mother of the arts, the most honorable and the most prolific of good to the world, to which all other arts pay grateful homage, and with which science itself seeks honorable association. May agriculture be ever cherished by the American citizen as the interest of his country greatest in honor, dignity, and importance, and constituting the very foundation of its independence, wealth and power.

A portion of the sum appropriated for agricultural purposes has been applied to the purchase of seeds for distribution; some of which are of new varieties, although not so many as desired. The interruption of the agricultural labors of this office in 1846, and the difficulty of establishing agencies abroad, by which new seeds could be obtained, have prevented the procuring of many from other countries. Yet the varieties which will be distributed are believed to be valuable, and worthy of introduction into those portions of the country in which they are not generally known and cultivated. The quantity distributed will more than equal that of any former year, and will exceed sixty thousand packages. A portion of them has been presented to the Patent Office by the Minister of Agriculture and Commerce of France, through the generous intervention of that well known and philanthropic gentleman, M. Vattemare, to whose glowing enthusiasm and untiring perseverance in the noble scheme of national interchange, of which he is the projector, this country, and particularly this office, are greatly indebted. Suitable acknowledgments and returns will of course be made.

The undersigned has also to acknowledge his obligations to his predecessor, the Hon. Henry L. Ellsworth, Charles Cist, Esq., Nicholas Longworth, Esq., and others, for able and valuable papers upon various subjects which will be found in the appendix to this report.

I also take great pleasure in bearing especial testimony to the very able manner in which Charles L. Fleischmann, Esq., formerly employed in this office, has prepared for the use of this office, the results of his observations during his tour in several of the countries of Europe, and particularly in Germany, in the summer of 1845. A portion of the results of his observations will be found in his very interesting article upon the management of sheep, wool-growing, agricultural schools, and many other subjects appended to this report.

It is doubtless well understood that the agricultural report of this office is limited, by the appropriation by which it was authorized, to four hundred pages. Especial pains have been taken to prevent its exceeding that limit. Yet, as it is impossible to determine the quantity of matter it will require to fill four hundred printed pages, it may fall short of, or may somewhat overrun that number. If the latter shall be the case it will, of course, devolve upon the respective Houses of Congress to determine whether or not the surplus matter shall be printed.

As the internal commerce of the Union, transportation on canals and rail roads, and the interior trade of cities, have an important relation to agriculture, I have endeavored to collect some statistics upon those subjects, which will be found embodied in one of the papers in the appendix to this report. The limited means at my disposal, and the difficulty of reaching the sources from which information in relation to such subjects can be derived, will, of course, account for the comparatively meagre and unsatisfactory results which are presented in the paper referred to. But they will serve to show, to some extent, the vast amount of the internal commerce of the Union, and the benefit which would result from full and accurate information upon that important subject.

In view of the great emulation and rivalry of nations in manufactures, trade and commerce, which mark and distinguish the present age, it is of the utmost importance, that those who are called to preside over the political and economical interests of great communities, should thoroughly inform themselves of their resources and elements of power. Without this knowledge the legislator and statesman are but poorly qualified for the high trusts which they are appointed to execute. Therefore, in many of the enlightened countries of Europe, plans and systems have been devised and organized, through the instrumentality of which, comparatively accurate returns of theannual products of labor and capital employed in the various branches of industry in which their citizens are engaged, are obtained.

In this country no such system has been organized; yet, it is believed, one might be, with very little expense and with very beneficial results. Much, however, would depend upon the co-operation of the individual states of the Union for the success of such a plan. It would not be difficult to obtain returns approximating to accuracy, of the industry of any state, if its legislature were to require by law the assessors of taxes or other appropriate officers, to take a census every year, when they were performing their other duties, of the capital and products of all the important interests, agricultural, manufacturing, mining and commercial. The enquiries should embrace every pursuit and every product; in agriculture, the quantity of land cultivated and appropriated to each crop, the amount of each crop, even to the most unimportant, the number and increase of animals, products of the dairy, &c. &c. In manufactures, mining and commerce, they should embrace the amount of capital employed; the quantity and value of raw material consumed, and of products; wages of labor; in short, every thing, which would tend to show their extent and importance. These returns, analysed and condensed by some officer of the State Government, appointed for the purpose, and then transmitted to some appropriate bureau or department of the general government, and there embodied in the form of tables, would each year present a rent-roll or income sheet, which would surprise by its results, and exhibit at a glance the vast resources of the republic.

In some of the States this plan has been partially adopted, and the result has been most gratifying. In 1845, Massachusetts caused such an investigation to be made of the products of its capital and industry, and the result exhibited an aggregate value of $114,478,443. It is a proud monument to the intelligence, enterprise and energy of her people. Other States could doubtless exhibit an income sheet quite as flattering, if they would take the pains to procure the materials with which to make it up.

I have been informed that a bill has been introduced and is now pending in the Legislature of Louisiana, providing for the establishment and organization of a bureau of statistics. It is ardently hoped that the measure may be carried, and that the example which will be thus set by Louisiana, resulting from an enlightened view of the importance of her great interests, agricultural and commercial, will be speedily followed by other States of the Union. All have industrial interests of sufficient importance to justify the establishment of such a bureau in their respective governments.

I have the grateful satisfaction of acknowledging the receipt of a very valuable donation of books which have been bestowed upon this office by the Minister of Agriculture and Commerce, and other high official persons connected with the French Government, and by several of the institutions and societies of the city of Paris, which were presented through the intervention of that distinguished and indefatigable philanthropist, M. Alexandre Vattemare, so honorably known as the founder of the system of national interchange. Receiving the donation in the spirit in which it was bestowed, namely, for the noble purpose of cultivating and cherishing sentiments of friendship and amity among nations, I deemed it to be my duty to make, as far as it was in my power, a fit and appropriate recognition of the gift. I have therefore caused to be prepared for delivery to M. Vattemare, and presentation to the several officers of the French Government, and the institutions of Paris, and to several of the cities of France, copies of the reports of this office, which will hereafter be forwarded to them from year to year. I have also caused to be prepared, especially for the office of the Minister of Agriculture and Commerce of France, drawings and descriptions of the most valuable inventions and improvements which have been patented at this office during the last year.

I am also informed by M. Vattemare, that the Minister of Agriculture and Commerce, in furtherance of the system of national interchange, has consented to make preparations for a fair to be held in the city of Paris, at some time in 1849 to be hereafter appointed, for the exhibition of the products of American genius and skill. To that fair the American inventor, manufacturer, and artizan, will be invited to send models and specimens of machines, fabrics, and manufactured articles, and ample provision will be made to receive and exhibit them conspicuously. It is also proposed that, at some suitable time, a similar exhibition shall take place, of specimens of the genius and skill of the inventors, manufacturers and artisans of France, in one of the cities of the American Union. Of course the accomplishment of this grand design will require the cordial co-operation of the citizens of both countries. It is hoped and believed, that the concurrence and aid of our ingenious countrymen will not be withheld from this novel and interesting experiment.

In conclusion, I would respectfully invite the attention of Congress to the necessity of enlarging the Patent Office building. Already the rooms appropriated to the reception and arrangement of the models, have become so crowded as to prevent their proper classification, and to cause serious embarrassment to the business of the office. And, if Congress should authorize the increase of force required in the scientific department of the office, there will not be a sufficient number of convenient and suitable rooms for the accommodation of the official corps. It is, therefore, suggested, that provision be made at the present session for the construction of the two additional wings contemplated in the plan of the Patent Office adopted by Congress. As it would take two or three years to complete them, the accommodation which they would furnish, would be very much needed long before they could be completed. If the National Gallery were appropriated to the use of the Patent Office, the necessity of the enlargement of the Patent Office building above recommended, would not be so urgent. But as that spacious hall is now principally occupied by articles belonging to the Exploring Expedition, which were directed by an act of Congress to be deposited there, and will continue to be thus occupied until the completion of the edifice of the Smithsonian Institution, it cannot be appropriated to the use of the Patent Office for some years. In view of this fact I have deemed it my duty to recommend an early appropriation for the enlargement of the Patent Office Building.

By the act of March 3, 1837, relating to the Patent Office, the Chief Justice of the District of Columbia was constituted the appellate tribunal of the office, to which appeals from the decision of the Commissioner of Patents have since been taken. From that time down to the present many appeals have been taken from the decisions of the Commissioner, and decided by the Chief Justice, who has sustained his decisions by able and elaborate opinions, involving important principles of patent law. In the judgment of the undersigned, the publication of those opinions are important for the information of persons doing business at the Patent Office. I have therefore appended a copy of them to this report, to be published or not, as may by either house be deemed expedient.

I have the honor to be, very respectfully, your obedient servant,

EDMUND BURKE,
Commissioner of Patents

To the Hon. R. C. Winthrop,
Speaker of the House of Representatives.

A.

Statement of receipts for patents, caveats, disclaimers, improvements and certified copies, in 1847.

Amount received for patents, caveats, disclaimers, and improvements,	$61,217 50	
Amount received for copies,	1,893 69	
		$63,111 19
Deduct paid on withdrawals, and money paid in by mistake, refunded,		8,008 43
		$55,102 76

B.

Statement of expenditures and payments made from the Patent Fund, by the Commissioner of Patents, from January 1 *to December* 31, 1847, *inclusive, under the act of March* 3, 1839, *viz.*

For salaries,	$16,350 00	
For temporary clerks,	6,937 57	
For contingent expenses,	8,657 77	
For compensation of district judge,	100 00	
For the library,	1,049 58	
For agricultural statistics,	465 00	
		$33,559 92
		$21,542 84

C.

Statement of expenditures on the restoration of the Patent Office, under the act of March 3, 1837; *viz.*

For restoring the records and drawings,	$310 00

Recapitulation.

Amount of receipts from all sources,		$63,111 19
Amount paid on withdrawals, as per Statement A,	$8,008 43	
Amount paid for salaries, &c., as per Statement B,	33,559 92	
Amount paid for restoration of records, &c., as per Statement C,	310 00	
		$41,878 35
Leaving a net balance to the credit of the Patent Fund, of		$21,232 84
Balance in the treasury to the credit of the Patent Fund, January 1, 1847,		186,565 14
Balance in the treasury, to the credit of the Patent Fund, January 1, 1848,		$207,797 98

D.

Patent Office, *January* 6, 1848.

To the Hon. Edmund Burke,
Commissioner of Patents:

Sir: In conformity with your requisition, I have the honor herewith to submit the following notice of inventions referred to me for examination.

From the great accumulation of business and the inability of the present limited number of examiners in your office, to prevent its increase, it will hardly be expected that this report should embrace such detail of subjects as has been given in former years, as the time required for the collection of the facts must necessarily be taken from the now pressing duties of examination of cases waiting their turn. It may be sufficient to state, that in the year 1846, the number of applications for letters patent presented to the office, was 1,272. On the first of January, 1847, there were 147 applications at my desk waiting for examination. During the year 1847, the number of applications presented to the office was 1,531, and on the first of January, 1848, the number of applications at my desk, waiting for examination, was 423. Thus it appears, that the accumulation of cases, unexamined, has increased, in a greater ratio, than the increase in the number of applications. This condition of things is necessarily consequent upon any considerable accumulation of unexamined applications, as these cases are daily the subjects of reference, with a view to avoid interferences, and from the eagerness of inventors, they become daily the source of correspondence and other kinds of attention operating seriously to retard and interfere with the investigation of cases duly before the examiners.

The following notice of patented inventions has been prepared with as much care as the state of affairs would allow:

AGRICULTURE.

Number of patents granted, 43.—In agricultural pursuits a marked disparity is exhibited between this and every other country. We are an agricultural people, and pride ourselves with pre-eminence in this respect. But our advance and advantages are characteristic, and are to be found chiefly on that side of the *median line* in this wide field of occupation which marks the boundary between mechanical and chemical economy of farming. In the husbanding of farming resources we are much behind European nations, and even, perhaps that singular people the Chinese; while, in variety, extent and utility of labor-saving instruments for agriculture, we greatly excel. The difference obviously grows out of the differing necessities and characteristics of the people and the soil. If records of patented inventions may be considered a fair exponent of the mechanical facilities enjoyed by the agriculturists of different countries, then the above position is correct and the comparison striking. The whole number of patented inventions in this country, belonging to the class of agriculture, is 2,043. In this class are included, not only the various instruments for tilling the earth, entering and gathering crops, and preparing them for market, but also every implement and machine belonging to the comprehensive subject of rural economy.

Plough.—A very novel modification of this implement has been patented, in which the mould board revolves upon a central pivot. The mould board in form is concavo-convex, or shaped like a shallow dish, through the centre of which passes the bearing or pivot, the convex side of the mould board being towards the land.

Horse Rakes.—Two forms of horse rakes have been patented.

In both these inventions the subject of improvement is the mode of liberating the rake before it is turned over, and to check it in proper time as it comes round. In one of these rakes the turning is made upon segment wheels and much facilitated, while the liberating and checking of the rake is effected with great ease and certainty.

Cheese Shelf.—A convenient apparatus, for the purpose of turning and drying cheeses, has been patented, in which a number of cheeses are turned by one operation. A frame containing a series of shelves is made so as to revolve upon a horizontal axis, and the whole is readily inverted for the purpose of turning the cheeses upon the shelves prior to the inversion, shelves are placed over the cheeses, which, after the inversion, become their support.

Fruit Gatherer.—An instrument of this class has been patented which gathers, or rather receives the fruit as it falls from the tree, without bruising, and conducts it into barrels. It is an old practice to hold or suspend a sheet under a tree to receive the fruit without injury. The patentee in this case provides a large sheet, consisting of parts so put together as to form a number of tapering funnels, the small ends of which are let down into barrels to receive the fruit.

Curry Comb.—Several minor improvements have been made in the last year in this instrument. One deserving especial attention has been patented, in which the cleaning of the comb is effected with the greatest ease. A hinged plate, through which the rows of teeth pass, and which catches most of the dirt, is occasionally raised up and brushed off, and as the teeth pass through the narrow apertures in the plate, they are stripped of whatever adhered to them, and thus it is but the work of a moment to clean the comb.

Corn Crushers.—A number of machines have been recently introduced for cutting and grinding corn fodder. In this, as well as many other sections of country where corn is raised with such facility and grass so apt to fail, it is highly important to the farmer to reduce the corn stalk to an esculent form, instead of allowing them to stand in the field or be wasted in any other way. The construction of machines for effecting this object is simple, and consists mainly of the combination of a straw cutter with two grinding or crushing cylinders, the cutting knives being larger than in the straw cutter to suit the material to be cut. As the corn stalks are cut by the knives into short pieces, these are received into a hopper which conducts them between the grinding or crushing rollers. Two machines of this class have been patented during the past year, promising a successful accomplishment of the operation.

CHEMISTRY.

Number of patents granted, 25.

As this branch of science is progressing more rapidly than any other of the present day, its application to the arts in a measure keeps pace, and the past year exhibits an interesting catalogue of inventions under this class.

But little credit can be claimed for our own country in the advancement of the science of chemistry in comparison with Germany, France, Sweeden and England. But while we admit the deficiency, and plead the infancy of our institutions as the most obvious and natural apology, we are warranted upon facts in claiming pre-eminence in the application of chemistry to the arts; and this without necessarily arrogating genius, as our advancement in this latter respect is perhaps due to that very condition which we have pleaded for our backwardness in science. The foreign applications under this class have been few, and two of the patented inventions presenting uncommon interest, were from citizens of the United States residing abroad.

The newly applied substance known chiefly by the name of Gutta Percha*, has been a most fruitful subject of applications for letters patent, and although no patents have yet been granted, still, in some cases, the claims have been admitted, and some information concerning this curious substance may be very desirable at this period.

The following extracts give full information upon the subject of Gutta Percha:

Gutta Percha, (Lond. Jour., Bot. No. LXI., Jan'y. 1847, p. 33.)

This is a vegetable substance, which though only known to Europeans for a few years, is now extensively used in the arts for various purposes, as a substitute for caoutchouc, because it has the valuable property of dissolving without being vulcanized. But while thus frequently employed, and constituting an important article of commerce, the plant which produces it was unknown until by a lucky accident, during the residence of Mr. Thos. Lobb in Singapore, where he has been (and in other Malay Islands) employed in a botanical mission by Mr. Veitch, of Exeter, he detected this plant and sent home numerous specimens which prove it to be a new sapotaceous plant, of which a figure and description will shortly appear in this Journal, under the name of Bassia's Hook, accompanying numerous well dried specimens, (though unfortunately without corollas.) Mr. Lobb judiciously sent small sections of the wood, which is peculiarly soft, fibrous, and spongy, pale colored, and traversed by longitudinal receptacles or reservoirs, filled with the gum forming ebony black lines.

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* Gutta Percha, a Malay term signifying Ragged Gum, pronounced as if spelt Gutta Pertsha. Gutta Percha has not yet been fully investigated as to its chemical composition, and it does not appear whether in relation to caoutchouc it presents a case of isomorphism or isomerism. In the first case it would present a substance differing in chemical constitution from caoutchouc, but assuming similar form and physical properties; in the second case the two substances would resemble each other in chemical constitution, but differing in form and physical properties. The Gutta Percha, however, appears in a variety of forms, in some of which it closely resembles caoutchouc in physical properties, while in other forms these properties are hardly recognised.

According to Faraday, the composition of caoutchouc is carbon 87.2 and hydrogen 12.8. According to Dr. Maclagan, the composition of Gutta Percha is, carbon 86.36, hydrogen 12.15, while, according to Soubeiran, Gutta Percha gives carbon 87.8, hydrogen 12.2. The disagreement in these two analyses would warrant further investigation, and it seems not unlikely that the new substance will be found isomerical with caoutchouc.

Like caoutchouc it is soluble in coal naptha, in caoutchoucine, in turpentine, and in ether. and insoluble in alcohol and water. Its most remarkable and distinctive property, as stated by Dr. Maclagan in his communication to the Scottish Society of Arts, is the effect of heat upon it. When placed in water at 110 Fah'r., no effect is produced upon it; but when the temperature is raised to 145 or upwards, it gradually becomes so soft and pliant as to be capable of being moulded into any form, or of being rolled out into flat plates.

When in the soft state it possesses all the elasticity of common india rubber, but it does not retain this property long. It soon again begins to grow hard, and, in a short time, varying according to the temperature and the size of the piece, regains its original hardness and rigidity. The specific heat of this substance has not yet been determined, and it would be interesting to compare it, in this respect, with caoutchouc.

It appears that a gentleman, Dr. Montgomerie, was the person who first brought the Gutta Percha into public notice. He writes thus in the Magazine of Science, 1845: I may not claim the actual discovery of *Gutta Percha*, for though quite unknown to Europeans, a few inhabitants of certain parts of the Malayan forests were acquainted with it. Many, however, of their neighbors residing in the adjacent native villages, had never heard of it; and the use to which it was applied was very trifling, for I could only ascertain that it was occasionally employed to make handles for *parangs* (or wood choppers) instead of wood or buffalo horn. So long ago as 1822, when I was assistant surgeon at Singapore, I was told of *Gutta Percha*, in connexion with caoutchouc; and some very fine specimens were brought to me. There are three varieties of this substance, *Gutta Girek*, *Gutta Tuban*, and *Gutta Percha*. I may here mention that the latter name is often erroneously pronounced in England, the *ch* is sounded by the Malayans like these letters in our word *perch* (a fish.) And attention to this point is of some importance; for if our countrymen were to ask the natives for *Gutta Perca*, they would probably be told that such a substance was unknown, while plenty of *Gutta Percha* might be procured by pronouncing the word correctly. The name is pure Malayan; Gutta meaning the gum, or concrete juice of the plant, and *Percha*, (pronounced *Pertcha,)* the particular tree from which it is obtained. I could not help thinking that the tree itself must exist in Sumatra, and perhaps derive its name from thence, the Malayan name for Sumatra being *Pulo Percha;* but though the Straits of Malacca are situated only one degree to the north of Singapore, I could not find that the substance has ever been heard of there or in Sumatra. But to return to the period when I first noticed the parang handle that was made of *Gutta Percha;* my curiosity being excited by the novelty of the material, I questioned the workman, a Malay woodsman, in whose possession I saw it, and heard that the material of which it was formed could be moulded into any other form by dipping it into boiling water till it was heated through, when it became plastic as clay, regaining when cold its original hardness and rigidity. Dr. Montgomerie goes on to say that he purchased the *parang* handle and sent for more of the substance, and that on instituting experiments he ascertained that *Gutta Percha* was likely to prove a most valuable material for making those parts of surgical instruments which had hitherto been formed of caoutchouc, the latter having the inconvenience of being easily injured by damp and hot weather in the tropics. The Medical Board of Calcutta highly approved of Dr. M's suggestion, and the Society of Arts in London awarded him its gold medal for the discovery.

Illness prevented Dr. M. at that period, from visiting the forests where the tree grows. He, however, ascertained from the natives that the Percha is one of their largest trees, attaining a diameter of three or four feet; that its wood is of no value as timber, but that a concrete and edible oil, used by the natives with their food, is obtained from the fruit. In many parts of the island of Singapore, and in the forests of Johone, at the extremity of the Malayan peninsula, the tree is found; it was also said to grow at Coti, on the south-eastern coast of Borneo, and Dr. Montgomerie addressed his inquiries to the celebrated Mr. Brooke, resident at Sarawak, and was assured by that gentleman that it inhabits commonly the woods there also, and is called *Niato* by the people, who are not, however, acquainted with the properties of the sap. Mr. Brooke says the tree is often six feet in diameter at Sarawak, and is believed to be plentiful all over Borneo, and probably at the thousand islands that cluster to the south of the Straits of Singapore. Its frequency is proved by the circumstance that several hunhred tons of the *Gutta Percha* have been annually exported from Singapore since 1842, when the substance first came into notice. There is reason, however, to fear that the supply must shortly decrease, and the price be raised, from the wasteful mode in which the natives collect it, often sacrificing a noble tree, of probably from fifty to one hundred years growth, for the sake of twenty or thirty pounds of gum, which is the largest quantity any one trunk ever affords. The juice might, in all likelihood, be obtained from the *Percha*, as from other trees, by tapping, and thus procuring a smaller portion for several successive years; but this process is too slow for the Malayans, and is also less likely to be adopted because the forests are common property. The people fell the tree, strip off its bark, and collect its milky juice in a trough formed of the hollow stem of the plantain leaf, when, being exposed to the air, it soon coagulates.

Dr. Montgomerie suggests, among the less immediately obvious uses to which *Gutta Percha* is applicable, that of making raised type for the blind, and embossed maps for the same unfortunate beings; it takes a clear, sharp impression, and is also tough and durable; he thinks it would likewise be found serviceable in stopping decayed teeth.

In the abstract of the new patents given in the October number of the *Magazine of Science and the Arts*, we notice that C. Hancock, Esq., has taken out a patent for improving the manufacture of *Gutta Percha*. He suggests several methods of purifying the substance, which generally comes here much mixed with extraneous matter. It may be dissolved by heat and strained, or passed through a screw press, or melted by the addition of rectified oil of turpentine; and, after filtering through flannel or felt, the solvent may be evaporated. In every case the *Gutta Percha* should form a residuum of the consistency of dough or putty—this plastic state being gained by the maintenance of a suitable temperature during the above process.

Mr. Hancock would combine *Gutta Percha* with *caoutchouc*, and a substance called *gintawan*, (we have no clue to what this gintawan may be,) in order to form an elastic material impervious to water; varying the proportions according to the greater or less degree of hardness or elasticity required for making elastic bands, a compound is used where 50 parts of *Gutta Percha* are combined with 24 of gintawan, 20 of caoutchouc, and 6 of orpiment. From a mixture of these, Mr. Hancock also prepares a light, porous and spongy material suited for stuffing or forming the seats of chairs, cushions, mattresses, saddles, &c.; likewise, springs of clocks, clasps, belts, garters, and strings. Wherever the requisite is flexibility and elasticity, then the quantity of Gutta Percha should be diminished, and increased where firmness is wanted. By prolonging the process much hardness may be acquired, and moulds and balls of *Gutta Percha* will bear turning in the lathe, like wood or ivory. The material is also applicable to useful and ornamental purposes, as picture frames, door handles, walking sticks, chessmen, handles of swords, and knives, buttons, combs, flutes, &c., &c. By the admixture of sulphuric acid, or of a tenth or larger part of vegetable wax or tallow, any degree of solubility, pliancy and softness may be acquired; or the composition may be used as varnish to cover other materials, concealing any odor, and imparting a surface impervious to water. In printing and painting of silk or cotton, it seems applicable to many uses, for it amalgamates readily with colors; when interposed between two thin sheets of gold leaf or tin foil, it combines them firmly in one.

Numerous are the purposes to which Mr. Hancock proposes applying the *Gutta Percha*, but the above named may suffice for our readers.

Gutta Percha.—E. Soubeiran; (Jour. de Pharm., et de Chim, Jan'y 1847.) The chemical relations of Gutta Percha are almost identical with those of caoutchouc, separated from impurities by hot water and from the accompanying resins by alcohol and ether, the substance was obtained in a state of purity by Soubeiran. Submitted to an analysis it gave carbon 87.8, hydrogen 12.2; while according to Faraday, caoatchouc gave carbon 87.2, hydrogen 12.8.

The action of solvents is also similar with the two substances. Water and alcohol have no effect; ether and most volatile oils produce only imperfect solution. The true solvent is oil of turpentine, which produces a clear and colorless solution, from which the *Gutta Percha* may be obtained unchanged, by evaporation.

The specific gravity of *Gutta Percha* is 0.9791, that of caoutchouc being 0.9355. Prolonged exposure to a temperature of about 300° produces translucence and a deeper gray color; but hot or cold water gradually restore the primitive appearance.

An application suggests itself to us which we have not as yet seen mentioned. We refer to its use as a substitute for cork and other materials for air-tight closure of chemical vessels, through which tubes, &c. are to be passed. There is no doubt that in the hands of the chemist this substance will soon become one of his most valuable materials.

Before the British Association, (Atheneum No. 1027,) Mr. Buck having alluded to his experiments, described the mode he followed in obtaining his moulds.

It is to be rolled out on a smooth surface in sheets of any convenient size suitable to the object to be taken, and varying in thickness according to the size. For small objects, from the $\frac{1}{12}$ to $\frac{1}{16}$ of an inch, is thick enough. The sheet is dipped for a moment or two into boiling water, and placed warm upon the object, upon the surface of which it is to be carefully pressed with the finger point, or a convenient elastic pad, so as to insure its close and uniform adaptation. In moulding soft objects, it is of course necessary that they should possess elasticity or residency, as is the case with living or recently dead animal bodies.

The Gutta Percha does not seem to be applicable to taking moulds from very fragile bodies—such as many fossils which would not bear the requisite pressure nor admit of the removal of the mould when rigid, without risk.

The most delicate objects, however, and slender projections, if firm enough in the original, may in the plaster cast be removed from the matrix without any difficulty when the latter is softened by momentary immersion in hot water.

Mr. Jerdan stated that there were two kinds of Gutta Percha—one white, the other black. The former was the best for modelling. He had written to Mr. Brooke of Borneo, on the subject, who informed him that an unlimited supply might be obtained from that country.

Mr. Crawford said it was not hard till after it was submitted to the heat of boiling water. The proper way of pronouncing the word was Gutta Pertsha, which was a Malay term and signified ragged gum.

Caoutchouc.—The prepared caoutchouc has been before submitted to a high heat for the purposes of drying and induration; but a patent has been granted for exposing the article to a high heat when Paris white is introduced as a part of the composition. The patentee avers that the rubber thus prepared will resist the heat of the sun and artificial heat, and is not affected by exposure to cold. The degree of heat used is 560° Fahrenheit.

As nearly all the fabrics of prepared rubber have been very objectionable for articles of clothing or wear about the person from the odor and discoloring property of sulphur, any improvement dispensing with this offensive ingredient will be received with general interest. There have been various modes in occasional use for preparing rubber without this odor, but as the process of drying by sulphur is so much cheaper, it has come into general use to the exclusion of all others. A patent has been granted for a process of preparing this substance without the aid of free sulphur, and, as it is alleged, with equal economy. The specimens exhibited to this office were entirely devoid of sulphurous odor and of remarkably good texture. The invention consists in the employment of the acids of sulphur of a lower degree of oxygenation than sulphuric acid, in combination with suitable bases. The patentee prefers the use of the hyposulphites alone or in combination with other salts of the acids of sulphur—as for instance, the sulphites or with sulphurets. Another mode also of preparing the rubber has been patented, consisting of a series of novel steps or methods of treatment to be adopted before the complete fabric is obtained.

The first is the seasoning process, substituted for the old plan of exposing the raw rubber to the action of the atmosphere, which was slow and tedious. By the new process the rubber is exposed to the joint action of air and steam at 200° Fahrenheit, until the sap, as it is termed, is entirely removed.

The second step is that of drying the rubber when it is spread out and in the sticky or tacky condition. The rubber is exposed to the heat of steam at 250° or 300°, in an apparatus of peculiar construction, and is managed so as to avoid the condensation of steam upon the goods.

The third process is that of sulphuring or *thionizing*, as it is now generally termed. Instead of mixing the sulphur with the mass, the rubber is submitted to the action of the fumes of sulphur or sulphurous acid gas, either before or during the curing process.

The fourth is the substitute for sunning, a method formerly adopted, and one of much uncertainty. The rubber, while its surface has the peculiar clammy feeling is exposed to the vaporizing action of a rapid current of air. There are also three other claims to machinery and contrivances by which the above principles of operation are carried into effect.

As a matter of general information it may be well to observe here, that the method of preparing india rubber by solution in turpentine or other menstruum, is mostly discontinued. The rubber is reduced to a pasty mass by a heavy grinding operation, and then carried through a succession of rollers until it is brought into sheets of uniform texture. During the grinding operation great heat is developed, and during the rolling great quantities of electricity.

Turpentine and Rosin.—A patent has been granted for refining turpentine for the production of the pine oil, as it is termed, for burning in lamps. The resinous matter is separated by treating the turpentine with potassa, and in order to effect thorough admixture the liquid is forced through a succession of fine strainers. After this operation rain water is added and the whole suffered to stand for twelve hours, when the pure spirits will be found floting above the water and impurities, from which it is drawn off.

A patent has been granted for an improvement in the distillation of crude turpentine, consisting merely of an agitator or stirring apparatus, working without the still, the shaft of the agitator passing through a stuffing box in the top of the still.

The stirring of various liquids in the operation of boiling is a common device, but has never been before applied in the production of turpentine, and is in this case, as asserted, attended with considerable advantages. Turpentine consists of two liquids, one boiling at a much higher temperature than the other, which is obvious from the very interesting fact, that while boiling without pressure its temperature may be raised more than 200°.

In view of this constitution of turpentine, (although unknown to the inventor of the improvement,) the application of the stirrer in this particular case was considered novel and advantageous.

Bleaching Resin.—A patent has been granted for a mode of bleaching resin by the following process: Take 12 gallons of caustic potash or soda of 5° to 10° hydrometer, for heavy liquids, and raise the ley to a boiling heat. This is then charged with a barrel of rosin and the heat continued until the water boils through it. Then add 15 gallons of boiling water, continuing the heat with agitation; and when it has boiled five minutes the heat is discontinued, but the agitation kept up as long as practicable. The alkali is drawn off and the coloring matter washed out with boiling water.

Bleaching Shellac.—A patent has been granted for bleaching this substance by first treating it by heat with pure carbonate of potash and subsequently with chloride of lime mixed with chloride of soda. Tartaric acid is then added to the solution, when the pure gum floats upon the surface and is removed and washed. The specimens of the bleached gum and the bleached resin were both exhibited and proved the success of the operation.

Sugar.—Several patents have been granted for alleged improvements in making sugar, relating to the first operation in the cane juice. This most critical, and hence, in reality, the most important step in the process of sugar making, has been, within a few years past, the subject of such varied experiments and diverse opinions that nothing definite can be said of the value of the several inventions for which letters patent have been granted. The chemical changes are so rapid in the expressed juice of the cane that it becomes of the highest importance to defecate quickly, or remove those substances which cause such changes.

Letters patent have been granted for a process aiming at this object, in which the cane juice is speedily brought to a heat above the boiling point by heating under pressure, as it is alleged, for the purpose of more effectually coagulating the albuminous matter and causing the separation of other impurities.

Another patent has been granted for defecating cane juices by means of the saccharate of lime instead of the cream of lime, commonly used, and subsequently removing the lime by means of an acid or acid salt. The inventor proposes the use of sulphurous, sulphuric or phosphoric acid.

Paper Pulp.—A patent has been granted for the mode of making the pulp from straw. The material of straw has long been used for this purpose, but the mode of treatment is believed to be new and is as follows: The straw, or other vegetable fibrous material, is heated or boiled with milk of lime twelve hours, in a suitable boiler, and the lime and coloring matter washed out in a suitable tub. The fibrous matter is then transferred to millstones, so arranged as to crush it, and at the end of this operation the pulpy matter is again transferred to another tub for further washing out the coloring matter. The pulpy matter is next removed to a second set of boilers, where fresh lime-water and an alkaline solution of the strength of two to four degrees of the hydrometer is supplied, and the heat continued for six hours.

At the end of this time the whole liquor and pulp are forced up by steam pressure into a third washing tub, where it is washed, and sulphuric or muriatic acid of the ordinary strength used for bleaching purposes, is supplied, and the contents kept in agitation for two hours, and the acid is then entirely washed out. The pulp is next returned to the second set of boilers, where it is mixed with alkali of the strength of two to four degrees of the hydrometer, and boiled four hours, or until the alkali is spent.

The pulp and liquor are again forced up into the third washing tub, and all soluble matters washed out of it. Chloride of lime of the ordinary bleaching strength is now added, and agitation kept up for two hours longer; when steam is let on and the boiling continued until the salt is spent, when the whole is discharged into the fourth tub, where the spent chloride of lime is washed out. The pulp is now subjected to the operation of *souring*, which consists of submitting it to the action of acid and water of the usual strength used for bleaching, and keeping the whole in agitation for four hours. It is now ready to be discharged into a fifth tub or set of tubs, when the process is considered as completed.

The most interesting and probably the most valuable of the patents granted during the last year, under the subject of chemistry, are two which have been granted to an American citizen, now residing in England. One is for the manufacture of sulphate and muriate of potash from feldspar, and the other for decomposing alkaline salts by the action of steam at a high temperature. The latter appears highly interesting as a purely scientific discovery, apart from its practical value. In this exhibition of the solvent power of steam, we see at once a new, powerful and most economical chemical re-agent.

In the process of decomposing feldspar, the inventor heats together a potash feldspar, lime or its carbonate, and the sulphate of either lime, baryta or strontia, and afterwards lixiviates the mixture with water. The heat is to be kept at or above redness. In obtaining the muriate of potash, the muriate of either soda, lime or iron is added to the potash feldspar, in place of the sulphate above-mentioned, the modus operandi being substantially the same as in obtaining the sulphate.

The process of decomposing salts by steam is so replete with interest and novelty as to warrant the citation in full of its description by the inventor.

My invention consists in a method of decomposing the sulphates and muriates of the alkalies and alkaline earths, by exposing them at a high temperature to a current of steam or vapor of water, by which the acid is carried off, and the alkaline base either remains free, or enters into combination with some third substance provided for that purpose.

To decompose sulphate of lime, and obtain from it sulphuric and sulphurous acids, and free lime, I proceed in the following manner: I have a fire-clay cylinder of close texture, and of any convenient size, placed vertically in a furnace, and provided with openings at the top and bottom, for charging and discharging, which openings are capable of being closed air-tight. To the top of this cylinder I adapt an escape tube of fire-clay, for conveying off the acid vapors; and to the bottom, for the admission of the steam, I adapt another clay pipe, connected with a steam boiler, by a series of fire-clay tubes, which are to be kept at a red heat. In order to diminish the corrosion of the cylinder by the sulphate of lime or the lime itself, I line it with a coating of native carbonate of magnesia, applied in a similar manner to the usual clay linings of chemical furnaces. I fill the cylinder with pieces of sulphate of lime, about a quarter of an inch in diameter, and having luted the openings air-tight, I heat the cylinder and its contents to a high red heat. I then pass steam from the boiler, through the red hot clay tubes, into the bottom of the cylinder, and up through the charge. The heated steam, in its passage through the pieces of sulphate of lime, carries off the acid in the state of sulphurous acid and oxygen, with sometimes a little sulphuric acid mixed with it. The acid vapors pass off by the escape tube at the top of the cylinder, and I convey them by stone-ware tubes into a leaden chamber, in order to combine them into sulphuric acid by the usual means. I take care that the heat is not raised so high at first as to melt the sulphate of lime in the cylinder, but I increase it towards the end of the operation, the charge becoming more infusible when partly decomposed. I have an opening in the tube conveying off the acid vapors from the top of the cylinder, by means of which I examine the vapors from time to time, and from the relative acidity of these, ascertained by the usual tests, I judge of the progress of the operation. I regulate by a stop-cock the quantity of steam passed through the charge in the cylinder, maintaining the supply at that point which produces the greatest quantity of acid in the vapors. When the vapors cease to contain any notable proportion of acid, the cylinder and its contents being at a high red or low white heat, I shut off the steam, withdraw the charge from the cylinder by the lower opening, and put in a fresh one to be treated like the first. The charge thus operated upon will be found to consist chiefly of caustic lime. When I wish to obtain the acid and alkaline base from the sulphate of magnesia, I first drive off by heat all its water. I then introduce it, in small pieces, into a cylinder such as I have before described, and operate upon it in the manner directed for the sulphate of lime. But I take care to keep the heat at low redness at first, to prevent the fusion of the charge, which would choke up the cylinder and prevent the passage of the steam. The decomposition of the sulphate of magnesia takes place at a much lower temperature than that of sulphate of lime, (a low red heat is sufficient,) and a considerable part of the acid is given off in the state of sulphuric acid. When the charge has been treated as directed, the residue will be found to consist chiefly of caustic magnesia.

When I wish to decompose the sulphates of baryta and strontia, I operate upon them in a reverberating furnace. This mode is less advantageous for the manufucture of sulphuric acid than the use of the close cylinder formerly described, but I prefer it for the two last mentioned salts, because I consider their bases the more important product of their decomposition, and the hydrates of these alkalies, and particularly that of baryta, being fusible, would have much tendency to corrode the interior of the cylinder, at the heat necessary to decompose the salts. I use a common reverberatory furnace, with its hearth covered with a compact bed of native carbonate of magnesia, three or four inches thick. Several clay steam pipes are introduced through the roof of the furnace, so as to throw a current of heated steam over the whole width of the hearth; these pipes are connected with a steam boiler by a series of fire-clay tubes kept red hot. The sulphate, broken into pieces of about half an inch in diameter, is spread over the lining of carbonate of magnesia on the hearth of the furnace, and brought to a high red or low white heat. A current of steam is then admitted from the boiler, through the red hot tubes, upon the charge.

The acid of the sulphate is carried off by the steam, and when I wish to condense it, the acid vapors are conveyed along with the gases of the fire, into a leaden chamber, to be combined into sulphuric acid by the usual means. The quantity of steam thrown upon the charge is kept at the point which produces the most rapid evolution of acid, and the charge is stirred occasionally, so as to expose fresh surfaces to the action of the steam. As the contact of deoxidizing gases with the sulphate is injurious, I admit, if necessary, by suitable openings above the fuel, such an excess of air as will render the atmosphere in the furnace oxydizing. The sulphate of strontia requires a higher heat than the sulphate of lime for its decomposition, and the sulphate of baryta still higher than the sulphate of strontia.

When the sulphate of baryta is partly decomposed the mass melts and becomes more fusible as the decomposition proceeds. I judge of the progress of the operation by testing a portion of the charge from time to time; when it dissolves altogether or nearly so in dilute nitric acid, I withdraw the charge which now consists chiefly of the hydrate of baryta or strontia. To obtain muriatic acid, and the hydrates of baryta, or strontia, or caustic lime from the muriates of these bases, I employ the same process as that above described for the decomposition of the sulphate of baryta.

The sulphates of potash and soda may to some extent be decomposed by being subjected at a high temperature to the action of a current of steam in the manner directed for the decomposition of the sulphate of baryta. But owing probably to the volatile nature of the bases of these salts at a high temperature, no large proportion of them can thus be obtained in a free state. To aid therefore the decomposing action of the steam, I employ some substance capable when mixed with these sulphates, highly heated and exposed to steam, of forming a combination with their alkaline bases which shall yet when cold give up the alkali to the action either of water or of water and carbonic acid.

Of the large class of substances possessing these properties which for convenience, I will call combining substances, I prefer to use either alumina or the subphosphate of alumina. The alumina is prepared by strongly igniting the sulphate of alumina, or by any other well known process. The subphosphate of alumina is prepared (as directed in chemical works) by mixing solutions of the phosphate of soda, and the sulphate of alumina, and adding to the solution a slight excess of ammonia. I mix the alumina in the state of powder with an equal weight of the sulphate of potash or of soda also powdered, and spread the mixture upon the hearth of a reverberatory furnace, such as I have before described for the decomposition of the sulphate of baryta. The mixture is then heated, exposed to steam, stirred, and the operation conducted in all respects in the manner described for the treatment of the sulphate of baryta. When it is desired to collect the sulphuric and sulphurous acids produced by the decomposition of the sulphates of potash and soda, I prefer to moisten the mixture of alumina and the sulphate with water, and form it into balls about half an inch in diameter, which I heat and expose to steam in a close cylinder in the manner formerly described for the sulphate of lime. When a specimen of the charge shows by the usual tests that it contains no notable proportion of sulphate undecomposed, the operation is completed. I then withdraw the charge, lixiviate it with hot water, and when the clear solution of aluminate of potash or soda thus obtained has become cold, I pass through it an excess of carbonic acid until no more precipitate of alumina is formed. The clear solution of carbonate of potash or soda is then drawn off and evaporated. The alumina thus recovered is again used as the combining substance. When I wish to obtain the aluminate of potash or of soda, I merely evaporate the solution above described without introducing the carbonic acid.

The muriate of potash or of soda I merely evaporate the solution above described without introducing the carbonic acid.

The muriate of potash or of soda may also be decomposed when in a fused state by the action of steam, alumina or the subphosphate of alumina being present the operation is to be conducted in all respects in the same manner as that just described for the sulphates of potash and soda. But owing to the great volatility of the muriates of potash and soda when exposed at a high temperature to a current of air or steam, a large quantity of the muriate will escape with the steam and gases of the fire in the state of vapor undecomposed, and will be lost or will be difficult to condense. I prefer therefore to effect the decomposition of the muriates of potash and soda by causing their vapors intimately mixed with highly heated steam to pass slowly through a mass of small pieces of alumina kept at a high red heat. I use for this purpose a vertical fire clay cylinder lined with a coating of native carbonate of magnesia to diminish the corrosion of its sides by the alkali, and made with convenient openings at top and bottom for charging and discharging, which openings should be capable of being closed air tight. I arrange a cast iron retort so that its tube enters directly the cylinder near its bottom. The retort should have a charging door at the top capable of being made air tight, through which is introduced the muriate of potash or soda to be decomposed.

The muriates of potash and soda will not vaporize freely when fused and highly heated, unless the atmosphere above them is continually changed. This may be effected by a current of steam, and I find that I can sufficiently regulate the quantity of the salt volatized from the retort, by the amount of steam which I blow over its melted surface. I therefore insert a small steam pipe into the top of the retort, so as to throw a jet of heated steam upon the surface of the melted salt, and thus force its vapor to enter the cylinder. The quantity of steam thus introduced to aid the volatilization is not sufficient to decompose all the salt volatilized. The rest of the steam necessary for this purpose is passed directly into the cylinder by a fire clay pipe entering it near the bottom, and connected through a series of fire clay tubes kept red hot with a steam boiler. Both steam pipes are provided with cocks, an escape tube is inserted into the top of the cylinder to convey the acid vapor and the vapor of any undecomposed muriate into suitable condensers. I have an opening in this tube, by which I can withdraw at times a portion of the vapors in it, to examine their saline and acid characters

The cylinder and retort are to be so constructed and arranged as to allow their contents to be heated to high redness and upwards by any of the well known means. The mode of operating is as follows: The discharging door being closed air tight I fill the cylinder with alumina in pieces of about one quarter of an inch in diameter and fill the retort with the muriate of potash or soda and then close both the charging door of the cylinder and that of the retort air tight. I now bring the cylinder to a high red or white heat and the retort to a cherry red heat, so that the salt in it is melted and ready to volatilize freely at the admission of steam upon its surface: steam is now passed from the boiler through the red hot tubes into the cylinder by the pipe entering near its bottom, so that is filled with highly heated steam passing upwards in a slow current through the interstices of the pieces of alumina. I now admit by degrees a jet of heated steam into the salt retort, by the pipe entering its top, and thus drive a quantity of salt vapor into the cylinder, where it mixes thoroughly with the current of steam which has entered by the other pipe, and ascends with it through the column of highly heated alumina. In its passage the alkaline base of the muriate combines with the alumina, forming an aluminate of potash or soda, and the muriatic acid together with any salt vapor which may have escaped decomposition, passes off with the steam through the escape tube at the top of the cylinder into the condensers provided. The progress of the operation can be ascertained by examining the nature of the vapors which are passing through the escape tube.

When these vapors contain a large quantity of salt and are strongly acid at the time, I admit more steam through the pipe leading directly into the cylinder, and if this does not have the effect of diminishing the quantity of salt in the vapors, I lessen the quantity of steam thrown into the salt retort, and by that means decrease the supply of salt vapor driven into the cylinder. Where the escaping vapors contain but little salt and a large quantity of acid, I consider the operation as proceeding favorably and I always endeavor to regulate the quantities of steam passed through the two pipes and by that means, the proportions of salt vapor and steam thrown into the cylinder so as to produce this effect.

When the escaping vapors contain a large quantity of salt and steam and but little acid, the cylinder and its contents being at a high red heat, I consider that the decomposition of the salt is no longer effected in the cylinder, and I then shut off both currents of steam, withdraw the charge by the lower door and replace it by fresh alumina. The withdrawn charge is then lexiviated with hot water, and the solution of aluminate of potash or soda thus obtained is treated with carbonic acid, as before described.

The lining of the cylinder should be examined occasionally, and kept in repair so that the fire-clay may not be corroded by the alkali. Provided the charge of alumina in the cylinder is readily and equally permeable to the current of steam and salt vapor, the smaller the pieces of which it consists and the greater the surface they expose to the current, the more rapidly will the decomposition of the muriate proceed. The steam used need not be of a higher boiler pressure than will suffice to secure its passage through the charge in the cylinder. The subphosphate of alumina may be substituted for the alumina in the processes for the decomposition of the sulphate and muriates of potash and soda, and its action is even more powerful, but its first cost is greater. Although to aid the decomposition of the sulphates and muriates of potash and soda by steam at a high temperature, the use of either alumina or its subphosphate is preferred as the combining substance, yet there are a great number of substances which also possess the requisite properties, but act with various degrees of energy. Thus many salts which contain already a certain proportion of base, will yet, when exposed in contact with the sulphates and muriates of potash and soda, at a high heat to the action of steam form a combination with the potash or soda decomposable, when cold by water or water and carbonic acid. The subphosphates of lime, baryta, and strontia, and the subsilicates of lime, baryta, and strontia, will under these circumstances combine with the alkali and yield it to the action of water alone when cold. The sulphates of baryta and strontia although themselves decomposable by the action of steam at high temperatures are still capable of thus aiding in the decomposition of the sulphates, and muriates of potash and soda, and yield the alkali by the action of water. The neutral phosphates, and neutral silicates of potash and soda, when thus treated form basic salts which are soluble in water and decomposable by carbonic acid.

The alkalies, lime and magnesia, will also thus combine with a portion of free potash or soda which may be extracted by water. Other materials are capable of being used as combining substances; but I have named these which I consider preferable.

The decomposition of the muriate of soda by the action of steam at a high temperature may be applied to the production of sulphate of soda by exposing the muriate mixed with sulphate of lime to a high heat and to the current of steam. For this process I use a horizontal cylinder of close fire-ware, protected on the inside from the action of the lime or the sulphate by a lining of carbonate of magnesia, and provided with an opening for charging capable of being made air tight. Into the top of cylinder, at one end, a steam pipe is introduced, and from the other end at the top an escape pipe connects with suitable condensers for collecting the vaporized salt and acid. The cylinder is half filled with a mixture of equal parts by weight of sulphate of lime and muriate of soda, the opening made air tight, and the cylinder and its contents brought to a red heat. A current of heated steam is then admitted which passes over the surface of the melted mixture and carries off muriatic acid with more or less volatilized salt into the condensers. When the steam escaping from the cylinder ceases to contain any notable quantity of muriatic acid, the operation is discontinued and the charge is withdrawn. Its soluble salts are extracted by water and the sulphate of soda separated from any undecomposed muriate by evaporation and crystallization.

In this operation the heat should not be raised so high as to cause the decomposition by the steam of the sulphate of soda produced, or the sulphate of lime itself.

Though I prefer in all the above described processes heating the steam highly before passing it upon the salt to be decomposed, yet the same effect will be produced whenever the steam and salt are in contact at the proper temperature for the respective decompositions, whether they have both been previously heated, or one alone heated so highly as to be able to raise the other to the required temperature. As has been before stated, some of the salts are decomposable by steam at a much lower temperature than others, but with all the decomposition proceeds more rapidly in proportion as the heat is increased.

I claim as my invention the decomposing the sulphates of baryta, strontia, lime, and magnesia, and the muriates of baryta, strontia and lime, by exposing them at a high temperature to the action of a current of steam for the purpose of obtaining the acids and the alkalies of these salts respectively.

I also claim the decomposing the sulphates and muriates of potash and soda, for the purpose of obtaining the acids and the alkalies of these salts respectively, by exposing them at a high temperature to the action of a current of steam, alumina, or the other combining substances, being present.

I also claim making aluminates of potash and soda by the action of a current of steam upon a mixture of alumina and the sulphate or muriate of potash or soda at a high red heat.

I also claim the making sulphate of soda by the action of a current of steam upon the muriate of soda at a red heat, sulphate of lime being present as described.

Hardening Hides.—A patent has been granted for a process of hardening raw hide and rendering it transparent like horn; the process consists in

1st. Submitting the hides to the sweating operation, or otherwise to the liming operation, for removing the hair.

2nd. To the action of powerful astringents at an elevated temperature to remove the oily matters. The agents used are sulphuric acid, salts of tartar, and alum, dissolved in water.

During the operation of clearing the hides of the oil, they are rubbed, or friction is applied in any convenient way, whereby the hide becomes thickened; and after this process is finished, the hide is rinsed in warm water and dried.

3rd. The dried hides are submitted to the action of boiling linseed, or any other drying oil, and retained in the hot oil until a yellow scum appears on the surface of the hides, when they are withdrawn.

If it is desired to impart color to the material, as staining it in imitation of tortoise shell, it is done while in the oil bath, and when removed from the bath it is submitted to pressure in moulds for the formation of various articles, as knife handles, &c. For the article when it comes hot from the oil bath is very soft and pliable, but when allowed to cool it becomes hard, and susceptible of a high polish.

Photographic Pictures.—A patent has been granted for a process of producing and fixing pictures upon paper. It has been known for some time to the scientific community as the Talbotype.

Such a knowledge would debar a patent in England, but a subject of Great Britain or any other foreign power may, at any time subsequent to the publication of his invention in a foreign country, take out letters patent in this country, provided the invention has not been introduced into common use in the United States, and that in all such cases the term of the patent is limited to fourteen years from the date of publication of the foreign letters patent.

It was known to the office that the Talbotype had been the subject of experiment with individuals as a matter of investigation and scientific amusement, but this could not be construed as public and common use, and the patent has been accordingly granted. The description of the process by the inventor is full of scientific and practical interest, and is as follows, viz:

The first part of my invention is a method of making paper extremely sensitive to the rays of light. For this purpose I select the best writing paper having a smooth surface and a close and even texture.

First part of the preparation of the paper.—I dissolve one hundred grains of crystallized nitrate of silver in six ounces of distilled water. I wash one side of the paper with this solution with a soft camel's hair brush and place a mark upon that side by which to know it again, I dry the paper cautiously at a distant fire, or else I leave it to dry spontaneously in a dark place. Next I dip the paper in a solution of iodide of potassium containing five hundred grains of that salt dissolved in one pint of water; I leave the paper a minute or two in this solution, I then take it out and dip in water; I then dry it lightly with blotting paper and finish drying it at a fire, or else I leave it to dry spontaneously. The paper thus far prepared may be called for the sake of distinction iodized paper. When well made it is quite insensible to the action of light, and will keep for many years without suffering any change.

Second part of the preparation of paper.—This second part is best deferred until the paper is wanted for us. When that time is arrived, I take a sheet of the iodized paper and wash it with a liquid prepared in the following manner: Dissolve one hundred grains of crystallized nitrate of silver in two ounces of distilled water. To this solution add one-sixth of its volume of strong acetic acid: let this mixture be called A.; dissolve crystallized gallic acid in distilled water, as much as it will dissolve, (which is a very small quantity;) let this solution be called B. When you wish to prepare a sheet of paper for use, mix together the liquids A. and B. in equal volumes. This mixture I shall call by name of gallo-nitrate of silver. Let no more be mixed than is intended to be used at one time, because the mixture will not keep good for a long period. Then take a sheet of iodized paper and wash it over with this gallo-nitrate of silver with a soft camel's hair brush, taking care to wash it on the side which has been previously marked. This operation should be performed by candle light; let the paper rest half a minute and then dry it lightly with blotting paper. When nearly or quite dry the paper is for use; but it is advisable to use it within a short short time after its preparation.

Use of the Paper.—The paper thus prepared, and which I call talbotype paper, is placed in a camera obscura, so to receive the image formed in the focus of the lens. Of course, the paper must be screened or defended from the light during the time it is being put into the camera; when the camera is properly pointed at the object this screen is withdrawn, or a pair of internal folding doors are opened, so as to expose the paper for the reception of the image. If the object is very bright or the time employed sufficiently long a sensible image is perceived upon the paper, when it is withdrawn from the camera. But when the time is short or the objects dim, no image whatever is visible upon the paper, which appears entirely blank. Nevertheless, it is impressed with an invisible image, and I have discovered the means of causing this image to become visible. This is performed as follows:

I take some gallo-nitrate of silver, prepared in the manner before directed, and with this liquid I wash the paper all over with a soft camel's hair brush. I then hold it before a gentle fire, and in a short time, (varying from a few seconds to a minute or two,) the image begins to appear upon the paper. Those parts of the paper upon which light has acted the most strongly, become brown or black, while those parts on which light has not acted, remains white. The image continues to strengthen and grow more and more visible during some time; when it appears strong enough, the operation should be terminated and the picture fixed.

The Fixing Process.—In order to fix the picture thus obtained, I first dip it into water, I then partly dry it with blotting paper, and then wash it with a solution of bromide of potassium containing one hundred grains of the salt dissolved in eight or ten ounces of water, or else I fix it with a hot solution of hypo-sulphite of soda in the way described in a subsequent part of this specification. The picture is then washed with water, and then finally dried.

The picture thus obtained will have its lights and shades reversed with respect to the natural objects, vide-licet, the lights of the objects are represented by shades, and vice versa I call it a negative. But it is easy from this negative picture to obtain another which shall be positive or conformable to nature, vide-licet, a picture in which lights shall be represented by lights, and the shades by shades. It is only necessary for this purpose to take a second sheet of the same sensitive paper and place it in close contact with the first, upon which the picture has been formed; a board is put beneath them and a sheet of glass above; the whole is pressed into close contact by screws. Being then placed in sunshine or daylight for a short time, an image or copy is formed upon the second sheet of paper. This image or copy is often invisible at first, but the image may be made to appear in the same way that has been already stated; but I do not recommend that the copy should be taken on this kind of sensitive paper, on the contrary, I would advise that it should be taken on common photographic paper. This paper is made by washing good writing paper first with a weak solution of common salt, and next with a solution of nitrate of silver; but since it is well known, having been freely communicated to the public by myself in the year one thousand eight hundred and thirty-nine, and that it forms no part of the present invention, I need not describe it here more particularly. Although it takes a much longer time to obtain a copy upon this paper, yet the tints of the copy are generally more harmonious and agreeable.

In order to fix such positive copies, I recommend to dip them into three separate vessels of warm water, then into a cold solution of hyposulphite of soda, and lastly to dip them once more into three separate vessels of warm water.

The following may be considered auxiliary and additional modifications of my discovery or invention. I sometimes take a sheet of iodized paper and wash it over with a solution of gallic acid in water, and then dry it.

Paper so prepared, I call Io gallic paper; it will remain good a considerable time if kept in a press or portfolio. When wanted for use I wash it with a solution of nutrate of silver, which renders it sensitive to light and fit to be used in the camera.

This process differs from the Talbotype process before described by me, in not using the nitrate of silver and gallic acid in conjunction. I find it is advantageous to use them separately on many occasions because it removes the great inconvenience arising from the speedy decomposition of gallo-nitrate of silver. Since the yellowish tint of some Talbotype negative pictures impedes the process of taking copies from them; in order to remedy this defect, I plunge the picture into a hot bath of hypo-sulphite of soda or any other soluble hypo-sulphite, dissolved in about ten times its weight of water. This solution should be heated to nearly the boiling point. The picture should remain in it about ten minutes; it is then removed, washed and dried. By this process the picture is rendered more transparent, and its lights become whiter. It is also rendered exceedingly permanent. After this process, I sometimes wax the picture, by causing melted wax to penetrate into the pores of the paper, the object of which is to give increased transparency.

In the above described process, I claim as my own invention and discovery.

First,—the preparation of iodized paper as above described, which is not itself sensitive to light but serves as the basis of all the subsequent operations.

Secondly,—the employment of gallic acid, in conjunction with iodine, and the salts of silver to render paper extremely sensitive to light, the gallic acid not having been used in Photography previously to my discovery.

Thirdly,—it was not known previously to my discovery thereof, that paper could be impressed with a latent or photographic image. I claim this as my own discovery, and likewise the means of rendering the image visible at pleasure, viz. by washing the paper in the manner before described with gallo-nitrate of silver or with any other chemical liquids which act upon those parts of the paper only which have been previously acted upon by light.

Fourthly,—the using hot or boiling solutions of the hypo-sulphites in order to give increased whiteness to Talbotype photographic pictures, and at the same time, make them exceedingly permanent.

Fifthly,—the waxing Talbotype negative pictures, in order to make them transparent, and thus to facilitate the obtaining positive copies therefrom, the said pictures having been previously whitened by immersion in the hot solution of hyposulphite, as last mentioned.

Gun Cotton.—This interesting invention reported upon so fully last year, seems to hold its reputation for utility, though it has not yet been rendered available in the government service for firearms. Time may yet develope some mode of obviating the objections in this particular. It has, however, been extensively employed for blasting with much greater efficiency than gunpowder. The terrible explosion of the Gun Cotton Factory in England, proves that there is more danger in its preparation than at first apprehended.

There have been several applications for letters patent for alleged improvements in the preparation of gun cotton, one of which has been abandoned by the applicant; another rejected; and one waiting its turn for examination.

On the announcement of the discovery of gun cotton, it was considered by many as one of scientific interest only, and generally supposed to be of no practical value. But the fact of its present extensive manufacture and use, and the continuance of frequent applications for letters patent for alleged improvements in its preparation, warrant the presumption that it is to be a discovery of lasting benefit.

The following additional intelligence from the inventor himself upon this subject will doubtless be received with interest.

"The substance to which I have given in German the name of *schiesswolle*, and in English that of gun cotton, having excited a lively curiosity, it may be interesting to the scientific world to become acquainted with some details of the way in which I was first led to its discovery.

"The results of my researches on ozone, led me, in the course of the last two years to turn my attention particularly to the oxyds of nitrogen, and principally to nitric acid. The numerous experiments I have made on this subject have led me, as I have stated in detail, in Poggendorff's *Annalen*, to adopt a peculiar hypothesis on the so called hydrates of nitric acid, sulphuric acid, &c., as well as on the normal nitrates, sulphates, &c.

"For a long time I had entertained doubts as to the existence of compound bodies of this nature, which cannot be isolated, and which are stated to be capable of existing only in combination with certain other substances; for a long time also I had come to the notion that the introduction of these imaginary combinations had only been an apparent progress in theoretical chemistry, and that it had even impeded its development.

"It is well known that what has most contributed to the admission of the existence of these compounds, has been the opinion generally received among chemists respecting the nature of nitric acid. Starting from the existence of the compound of nitrogen NO_5, as an undoubted and demonstrated fact, notwithstanding the impossibility of isolating it, they always cite nitric acid to prove the existence of compounds which cannot exist in an isolated state. In my opinion, there is no degree of oxydation which is represented by NO_5, and what these chemists designate by the formula $NO_5 + HO$ must be considered as being really $NO_4 + HO_2$; I am even inclined to regard the normal nitrates $NO_5 + RO$, as compounds which must be expressed by $NO_4 + RO_2$. Amongst other motives which induce me to admit this opinion, I will mention the fact that we can obtain hydrated nitric acid, or a normal nitrate by the direct mixture of NO_4 with HO_2 or RO_2. Other considerations which I have had occasion to detail elsewhere, induce me also to consider hydrated sulphuric acid to have the form $SO_2 + HO_2$, and not that of $SO_3 + HO$, and a normal sulphate, that of $SO_2 + RO_2$. It is sufficient here to observe that SO_2 placed in presence of HO_2 gives rise to what is called hydrated sulphuric acid, and that SO_2 placed in presence of $B\,a\,O_2$ or $P\,b\,O_2$ gives rise to what is called sulphate of the oxyd of barium or of lead. Rose's compound, to which the formula $2\ SO_3 + NO_2$ has been assigned, should have, in my opinion, $2\ SO_2 + NO_4$. Admitting this, I considered it probable that the mixture of $2\ (SO_2 + HO_2)$ ($= 2\ (SO_3 + HO)$ with $NO_4 + HO_2$ ($= NO_5 + HO$) yields $2\ SO_2 + NO_4$, and that at the same time $3\ HO_2$ is disengaged, or enters into a loose combination with what is called the bisulphate of deutoxyd of nitrogen. In other words, I conjectured that a mixture formed with the dydrates of nitric acid and sulphuric acid would possess a very great power of oxydation, and would form a kind of *aqua regia*, in which the combination HO_2 would act the part of the chlorine. On this hypothesis, and abstracting HO_2 from the acid mixture by means of a proper oxydable body, there ought to remain Rose's compound.

"Guided by these suppositions, which, I admit, may be as little founded as they are contrary to the ideas received among chemists, I commenced in December, 1845, a series of experiments with a view to put my hypothesis to the proof; it will be seen, in the sequel, whether the results at which I arrived tend to confirm it.

"I mixed some flowers of sulphur and a certain quantity of the acid mixture of which I have spoken: immediately, even at a temperature of 32° F., a lively disengagement of sulphurous acid gas took place without the production of deutoxyd of nitrogen. After the reaction, which was accompanied by a development of heat, there remained a colorless liquid, which, mixed with water, disengaged a considerable quantity of deutoxyd of nitrogen, and acted generally as a solution of Rose's compound in hydrated sulphuric acid would have done.

"I should add here, that a mixture of four ounces of hydrated sulphuric acid, with a single drop of nitric acid, on the addition of flowers of sulphur, disengages a sensible quantity of sulphurous acid. To assure himself of the presence of the latter, the operator has only to hold over the liquid a strip of paper which has been covered with iodid of potassium paste and tinged slightly blue by exposure to chlorine. The liberated sulphurous acid will soon dissipate this blue color.

"Selenium and phosphorus are oxydized in the same manner at low temperatures in the acid mixtures in question; and this latter is modified to such an extent, that on the addition of water, an abundant disengagement of deutoxyd of nitrogen gas takes place.

"Iodine, even, in the shape of powder, and shaken up with the acid mixture, rapidly absorbs oxygen, when exposed to a low temperature; and there is formed, besides iodic acid, the compounds to which Millon has lately drawn attention. After the reaction a liquid remains, which, diluted with water, gives an abundant disengagement of deutoxyd of nitrogen and liberated iodine.

"My experiments on ozone having shown that this body, which I consider to be a distinct peroxyd of hydrogen, forms, as well as chlorine, at the ordinary temperature, a peculiar compound with olefiant gas, without apparently oxydizing in the least, either the hydrogen or the carbon of this gas. I had the idea that it would not be impossible that certain organic matters, exposed to a low temperature, would likewise form compounds, either with the peroxyd of hydrogen alone, which, on my hypothesis, secures in a state of combination or of mixture in the acid mixture, or with NO_4. It was this conjecture, doubtless, very singular in the eyes of chemists, which principally led me to commence experiments with common sugar.

"I made a mixture of one part (volume) of nitric acid, of 1.5 specific gravity, and two parts of sulphuric acid, of 1.85, at the temperature of 36° F.; I then added some finely powdered sugar, so as to form a very fluid paste. I stirred the whole, and, at the end of a few minutes, the saccharine substance formed itself into a viscous mass, entirely separated from the acid liquid, without any disengagement of gas. This pasty mass was washed with boiling water, until this last no longer exercised any acid reaction; after which I deprive it, as much as possible, at a low temperature, of the water it still contained. The substance now possessed the following properties: exposed to a low temperature, it is compact and brittle; at a moderate temperature, it may be moulded like jalap resin, which gives it a beautiful silky lustre. It is semi-fluid at the temperature of boiling water; at a higher temperature, it gives off red vapors; heated still more, it suddenly deflagrates with violence, without leaving any perceptible residue. It is almost insipid and colorless, transparent like the resins, almost insoluble in water, but easily soluble in the essential oils, in ether, and concentrated nitric acid; and in most cases it acts in general like the resins in a chemical and physical point of view; thus friction renders it very electronegative. I will add, that the acid mixture, by means of which this resinous body was obtained, has an extremely marked bitter taste.

I wished to make experiments also with other organic substances; and I soon discovered, one after another, all those about which there has been so much said of late, especially in the Academy of Paris. All this passed in December, 1845, and the first few months in 1846. In March I sent specimens of my new compounds to some of my friends, in particular to Messrs. Faraday, Herschel and Grove. It is necessary to note expressly that the gun cotton formed part of these products; but I must add, that hardly was it discovered when I employed it in experiments of shooting, the success of which encouraged me to continue them. Accepting the obliging invitation which I received, I went, in the middle of April, to Wurtemburg, and made experiments with gun cotton, both in the arsenal of Ludwigsburg, in the presence of artillery officers, and in Stuttgard, before the king himself. In the course of May, June and July, with the kind co-operation of the Commandant de Mechel, of M. Burkhardt, captain of artillery, and other officers, I subsequently made, in this city, (Bâle,) numerous experiments with arms of small calibre, such as pistols, carbines, &c., and afterwards with mortars and cannon—experiments at which Baron de Krüdener, the Russian ambassador, was several times present. I may be allowed to mention, that I was the person who fired the first cannon loaded with gun cotton and shot, on the 28th of July, if I remember aright, after we had previously ascertained, by experiments with mortars, that the substance in question was capable of being used with pieces of large calibre.

About the same time, and indeed previously, I employed gun cotton to blast some rocks at Istein, in the Grand Duchy of Baden, and to blow up some old walls at Bâle; and in both cases I had opportunities of convincing myself, in the most satisfactory manner, of the superiority of this new explosive substance over common gunpowder.*

Experiments of this kind, which took place frequently and in the presence of a great number of persons, could not long remain unknown; and the public journals soon gave, without participation on my part, descriptions, more or less accurate, of the results which I had obtained. This circumstance, joined to the short notice which I inserted in the May number of Poggendorff's *Annalen*, could not fail to attract the attention of German chemists: in the middle of August I received from M. Bœttger, professor at Frankfort, the news that he had succeeded in preparing gun cotton and other substances. Our two names thus became associated in the discovery of the substance in question. To M. Bœttger the gun cotton must have been particularly interesting, as he had previously discovered an organic acid which deflagrates readily.

In the month of August I went to England, where, assisted by the able engineer, Mr. Richard Taylor of Falmouth, I made numerous experiments in the mines of Cornwall, which were entirely successful, in the opinion of all competent witnesses. Experiments on the action of gun-cotton were also made in several parts of England, under my direction, both with small fire-arms and with pieces of artillery, and the results obtained were very satisfactory.

Until that time there had been little or nothing said of gun-cotton in France; and it will appear that the short notices which Mr. Grove gave at Southampton at the meeting of the British Association, and the experiments with which he accompanied them, served first to attract the attention of French chemists to this substance.

At Paris, the thing was at first considered hardly credible, and jokes even were passed upon it; but when there could no longer remain any doubt as to the reality of the discovery, and when several chemists in Germany and other countries had published the processes which they employed to prepare the gun cotton, then a lively interest was manifested in a subject which had just before excited derision, and it was soon pretended that the new explosive substance was an old French discovery. It was declared to be nothing more than the xyloidine first discovered by M. Braconnot, and afterwards investigated anew by M. Pelouze, and the only merit left me was to have conceived the happy idea of putting this substance into a gun-barrel. The knowledge of the composition of xyloidine ought to have sufficed to convince those who put forward that opinion, that it is not suited for fire-arms, on account of its containing too much carbon and too little oxygen for the chief part to be converted into gaseous matters during the combustion. It was moreover very easy to discover the essential differences between the xyloidine of Braconnot and gun cotton. Nevertheless the error was kept up for some months.

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* In the month of June, I made also the first percussion caps, and employed them with success for muskets, in the presence of the above-mentioned officers.

Matters stood thus, when, on the 4th of last November, a Scotch chemist, Mr. Crum, of Glasgow, published a memoir, in which he showed that gun-cotton is not the same product as xyloidine, but that it presents an essentially different composition; and towards the end of the same month, the French Academy received a communication of the same nature. The gun cotton was then no longer xyloidine; it was called pyroxyloidine, and the first was admitted to be unsuitable for fire-arms.

If, therefore, it is proved that from the commencement of 1846, I prepared gun cotton and applied it to the discharge of fire-arms and that M. Bœttger did the same in the month of August,—if it be admitted that xyloidine cannot serve the same purposes as this cotton, and if it be notoriously known that what is now called pyroxyloidine was not brought before the French Academy and the scientific world until towards the middle of last November, the idea of attributing to France the discovery of gun-cotton cannot be seriously entertained, or of assigning to me merely a practical application of that which another had discovered.

I appeal to the justice of Frenchmen, to decide the point to whom belongs the honor of not only being the first to apply the new substance in question, but also of having first prepared it—to M. M. Braconnot and Pelouze, or myself. I must, moreover, add expressly, that it was not xyloidine even which led to my discovery, however intimate may be its relation with gun cotton; it was theoretical ideas, possibly very erroneous ones, but which are peculiarly my own, as well as some facts which I was also the first to discover.

Suum cuique is a principle of morality on which society at large rests; why should it not be strictly respected in the republic of science? M. Pelouze is a distinguished chemist, and already possesses a sufficiently high reputation not to require to elevate his pretensions on the merits of others; and I am fully persuaded that this estimable chemist, of well known truth of character, will, appreciating with impartiality the circumstances which have occurred, freely render me the justice to which I consider myself entitled.

Bâle, Dec. 28, 1846.

The above article from Professor Schönbein was first published in the Archives des Sciences Physique et Naturelles.

Microscopic Examination of Gun Cotton; by Dr. Bacon, (Proc. Boston Soc. Nat. Hist., Feb. 1847, p. 195.)

Specimens of the cotton, before and after preparation, were put up in Canada balsam, on slips of glass, and covered by very thin glass. When viewed by transmitted light, with powers from 150 to 800, many of the fibres of the gun cotton appear thickened, but no other change can be perceived in comparison with the unprepared article. There is no appreciable difference in the transparency of the two.

They were now examined in polarized light by means of the polarizing attachment to the microscope. When the polarizing and analyzing prisms are so arranged as to afford a dark field, the riband-like fibres of the cotton before preparation are seen as luminous objects upon a black ground, and are tinged with bright and varied colors. They are thus proved to possess a strong polarizing power.

The gun cotton, under the same circumstances, presents an entirely different appearance. Its fibres are much less luminous, and have a nearly uniform dull blue color. It is evident that the process of preparation has so altered the structure of the fibres as to lessen very greatly their action on polarized light.

Gun cotton prepared by Dr. Jackson by immersion for twelve and for eighteen hours in the strongest acids, has not lost its polarizing power in any appreciably greater degree than after an immersion of three minutes only. This agrees with the results of other modes of trial in indicating that the latter period is sufficient for the complete preparation of the cotton when the acids are of full strength. In all the specimens there are some filaments so nearly destitute of polarizing power as to be nearly invisible on the black ground, but none have been found entirely without action. When the polarizing and analyzing prisms are in such a position as to give a bright field, a portion of the fibres become tinged with a color approaching to orange, while the remainder appear colorless, as in ordinary light.

Purifying Liquids by Galvanism.—A patent has been granted for an interesting process by which a feeble galvanic power is employed to separate salts, acids or alkalies from water or other liquids. Two porous vessels containing water are partly immersed in the liquid to be purified, and a zinc plate placed in one vessel and an iron plate in the other vessel. Other metals would answer, but the inventor prefers the above. The zinc and copper plate being connected by a wire, galvanic action is established, and the salts or other soluble matters are carried through into the porous cups, and these accumulate in one or the other according to the electrical relations of the impurities.

Lubricating Compounds.—A patent has been granted for a lubricating compound, which is represented to be already in extensive use for rail-car axles. Six parts by weight of whale oil are mixed with one part of asphaltum and heated gradually to 500° or 600° Fahrenheit, and then two parts of coal tar are added, stirring the mixtuee until the materials are incorporated. It is alleged to be a cheap and economical liquid and does not stiffen in cold weather, or agglutinate from use.

CALORIFIC.

Patents granted, 35.

Stoves.—This class of inventions has multiplied upon the office much above any other, and although the subject is in itself easy of comprehension, yet the examination for letters patent for a cooking stove is frequently attended with more difficulty and nice discrimination than would arise from an invention of a complicated character. Quite a number of patents have been granted for stoves, all presenting novelty of arrangement or combination, and yet it is difficult to select from among them all any one feature of decided interest.

A useful article of foot-stove has been patented, consisting of a vessel to be filled with hot water and surrounded with non-conducting material, and provided with an opening large enough to receive the feet and entirely cover them with a heating surface. In the ordinary foot-stoves the feet are warmed only from below, while the stove in question warms the feet above, and on the sides, as well as below.

An improvement in the boilers of cooking stoves has been patented, and although a most simple device, it is one which appears to have been much needed. Every one using a cooking stove must be aware of the difficulty and expense of boiling water in the largest size boilers. A portion only of the bottom being within the flue of the stove exposed to the fire, while the whole surface of the upper part is exposed to the air, it requires a large amount of fuel to raise the temperature of the water to the boiling point and maintain it for any length of time. This difficulty has been to a considerable extent removed by inclosing the boiler with a casing which is open at the bottom where it rests upon the stove, and allows the fire or the products of combustion to rise between the boiler and casing, and thus economizes much heat. A jacket around a boiler above a stove, merely to serve as a non-conductor, is an old device, but the novelty in this case consists in making this jacket to communicate with the flue of the stove, rendering it unnecessary to carry the bottom of the boiler far into the flue.

Heating Wheel Tires.—A patent has been granted for a furnace of peculiar construction, which, it is alleged, will heat the tire much sooner and with less fuel than the ordinary way of heating upon the ground in the open air. It is a circular furnace, made up of separate sections for the sake of portability, and may be used in or out of doors.

Drying Grain and Flour.—The subject of kiln drying grain is one of increasing importance, in view of the increasing exportation of that article. It is often remarked, that corn meal bread made at the North of Southern corn, differs essentially from that made at the South. It is doubtless to a considerable extent true, and the difference is not entirely due to the operation of transporting, but in a great measure to inattention to the proper drying of the grain. A greater number of applications for letters patent for corn kilns has been made during the past year than probably ever before within the same space of time. Several patents have been granted, but the principles of drying and heating have so long been well understood in their application to other materials that little else of novelty has been introduced than in the mechanical contrivances to suit the change of material.

Ventilators, or Chimney Caps.—The subject of smoky chimneys is one of so much moment and interest as to engage and invoke the attention of men of science, and involves the most important considerations of economy of fuel, personal comfort and health. Few subjects have been essayed by a greater variety and multiplicity of experiments than the curing of smoky chimneys, and yet there is wanting a practical manual upon this subject, which should provide remedies for the numerous contingencies. From a survey of facts it must be obvious that there can be no universal rule of construction and operation, and that in providing remedies they should be adapted to the varied circumstances of building and locality. This complication of the conditions renders the aid of science very necessary, and the subject at times has received attention from the British Association.

Several patents have been granted for chimney caps professing superiority over other known forms in improving the draft of chimneys. There are mainly three classes of chimney caps for the prevention of smoke. The first is a moveable cap which by a vane is made to turn in such manner as to have the exit of the smoke in the direction of the wind.

The second class is the cap in which, from peculiarity of form, the draft is increased by the tendency to produce a vacuum at the mouth of the exit pipe. Under this class the varieties of form are very numerous. The third class is one in which the cap revolves by the action of the wind, and this, operating to revolve a fan or spiral within the chimney flue, raises the smoke mechanically.

The caps of the first and third class generally obstruct the draft when they do not readily obey the action of the wind, which, from undue friction, and rusting of the axles or spindles upon which they turn, is too frequently the case.

Of the second class, two forms have been patented, termed the injecting and ejecting ventilator. The first is the reverse of the second in operation, and at first sight was so considered in its construction. Both forms were, upon the first examination, decided to be wanting in novelty, or so closely resembling other known forms as to present no distinctive feature. The cases, however, were open for explanation, and this was furnished in the most satisfactory manner by actual demonstration. As a mere change of form is not the subject of letters patent, and as in this class of inventions the value of the cap depends upon peculiarity of form and a slight difference in form sometimes makes a great difference in the result, a practical illustration is of great value in testing the question of novelty. The patentee of the past named ventilator, exhibited by complete experimental trials with an extensive apparatus, the full value and operation of his ventilator, and demonstrated in a conclusive manner the difference between his own invention and those to which he had been referred as presenting similarity. The principal features of the ejecting ventilator are, a conic frustum mounted upon a tube of some length, and a plate or fender supported at some distance above the flue or opening in the conic frustum. The diameter of the opening through the tube and conic frustum is the same as the diameter of the chimney flue. The cap is secured permanently upon the chimney and according to the experiments performed here, gives a strong upward draft, whatever may be the direction of the wind.

The injecting ventilator consists of a number of inverted conic frusta, so arranged that a current of air from any quarter, blowing upon the cap, causes a strong downward draft. The two ventilators are designed for combined, as well as separate use. The inventor contemplates their general application to ships, steamboats, crowded rooms, and, indeed, to all cases where ventilation is necessary. The experiment has been tried on ship-board with success. The injecting ventilator supplying the hold with air, and the ejecting carrying it rapidly out; and thus by a current of air in one direction these caps are made to co-operate, and must be more efficacious than the many contrivances for merely forcing air *into* the hold.

The inventor represents that one cap may be made to cover any number of flues in a chimney, and that in one instance, a chimney containing 14 flues, was surmounted by a large cap and the draft in all the flues made perfect. This invention has been submitted to the rigid scrutiny and received the approbation of the American Academy of Science and Art.

The inventor asserts that he has found but one condition under which the ejecting ventilator will not act to raise a draft. This condition can never occur when the cap is upon a chimney, and perhaps might never be found when the cap is in a vertical position. But it sometimes happens that stove-pipes are carried out of windows and through the side walls of buildings. The cap is serviceable in such cases except when the direction of the wind is exactly at right angles to the plane of the wall. If the direction of the wind is at all oblique to the wall of the building, the cap performs its functions; but when it blows directly against, or at right-angles to the wall, its function ceases. In a philosophical point of view this is a subject of great interest. The inventor has found, that the air, under the latter condition, is in a denser state than the surrounding air, which is readily proved by the barometer. The crowded or compressed state of the air in this case is readily accounted for, and the cessation of the function of the cap.

The subject of ventilating houses is perhaps of more importance in this city than most others. First, from the imperfect mode of making the interior walls of houses by putting the plastering directly upon the brick walls without the use of furring; the walls, more especially if papered, become exceedingly damp and mouldy, soon destroy the paper, and are disagreeable and unhealthy. A free circulation of air becomes very important, therefore, to counteract these evils.

Secondly, the chimneys are in almost every instance built without reference to scientific principles, being generally too low above the buildings, very rough inside from projecting brick and mortar, which materially obstructs the passage of the air, and generally having very awkward throats. The necessities of the case may be readily inferred from the great number and variety of chimney caps employed in this city, to the disfigurement of buildings, both public and private. It is to be regreted, that architects in this country, make this subject one of so little consequence as to suffer their works to be defaced by the awkward contrivances at present so numerous upon the public buildings.

MATHEMATICAL AND PHILOSOPHICAL INSTRUMENTS.

Numbers of patents granted, 6.

Mariner's Compass.—An improvement in the mariner's compass has been the subject of letters patent. In lieu of a single needle attached to the card there are three needles, two of which are movable on pivots in the ordinary manner, and one stationary, or permanently attached to the card. Their pivots, or centres, are all in the same meridian line. The instrument was compared with others in the office and found to settle in the magnetic meridian sooner than any of those tried of the ordinary construction. It presents novelty, and is believed to possess the advantage claimed for it.

Clocks.—A patent has been granted for a self-adjusting pendulum, by which the necessity of carefully levelling a clock is dispensed with. The pendulum is attached to a heavy pendulous bar, which has its centre of motion coincident with that of the pallet wheel, and thus in an inclined position of the clock, the pallets preserve their proper relation to the pallet wheel.

LEVER AND SCREW.

Number of patents granted, 12.

Packing Cotton in Cylindrical Bales.—A patent has been granted for a mode of pressing cotton, presenting novelty and claiming success. The cotton is made to mat by pressure rollers, and under pressure is wound upon a shaft from which it is removed when of sufficient size. If the pressure in this instance can render the cotton as compact as the powerful presses employed in packing bales of the usual form, there would be some advantage in managing the bales, but whether this advantage can compensate for the loss of room in stowing cylindrical bales, is a question to be decided by those connected with such business.

Steam Presses.—The steam press used principally for cotton appears to be coming into extensive use, and has been the subject of frequent applications for letters patent. The plan first proposed, and adopted for a while, was to apply the steam piston directly to the follower of the press. It has been found advantageous, however, to combine the piston with the toggle joint press, and for a peculiar mode of doing this, letters patent have been granted

STONE AND CLAY.

Number of patents granted, 11.

Lime Kiln.—A patent has been granted for an alleged improvement in the construction of the lime kiln, in which the kiln is built entirely of the material to be burned, instead of resorting to a kiln built of brick in the usual way.

LEATHER.

Number of patents granted, 15.

Scabbards, Bayonet Sheaths, and other hollow articles of Leather.—Under this head a patent has been granted for a mode of making sheaths of leather without stitching. A piece of thick leather of the form desired, is submitted to the operation of a vibrating knife which cuts out as much as is necessary for the article to be made. As the knife divides the leather the latter is carried forward through the machine, and when the knife has penetrated sufficiently far, the leather is drawn back and the article finished for use.

The specimens furnished were successful illustrations of the invention

HOUSEHOLD FURNITURE

Number of patents granted, 21.

Mattresses.—A patent has been granted for an alleged improvement in cotton mattresses which consists in putting layers of hair between the layers of cotton batting.

Sofa Table.—One of the most ingenious devices in household furniture ever presented to this office has been patented this year.

Many attempts have been hitherto made to combine various articles of furniture in one piece, such as sofas and beds, beds and wardrobes, beds and tables, &c., of which there are many specimens in the office. These devices frequently fail to go into use, from the complication and expense of the article. The sofa table alluded to differs but little in appearance from a common sofa, and with great facility and dispatch may be converted into a large table and two benches suitably cushioned. The back of the sofa, which extends nearly to the floor, is drawn up over and rests upon the two arms of the sofa, and the seat of the sofa is divided longitudinally in two parts, which are readily detached from the frame of the sofa and separated from each other, forming the two benches or seats for each side of the table. The invention appears to be well calculated for use in private and public apartments, but particularly suited for such places as the cabins of steamboats.

Rocking Chair and Fan.—A labor saving device under this title has been patented, which presents some novelty, and promises much comfort to the luxurious. A fan is so attached to the chair that the rocking of the chair vibrates the fan.

FINE ARTS.

Number of patents granted, 19.

Musical Instruments.—A patent has been granted for a novel species of musical instrument in which the tones are derived from tuning forks. The sound of the tuning fork is by itself feeble; but if while vibrating it be held over the mouth of a vessel which would give a vibration in unison with the note of the fork, the sound is very much increased. This fact has been long known, but the inventor has availed himself of it in a peculiar manner in the production of his instrument. By means of keys like those of the piano forte, the forks are struck with a hammer of a peculiar kind, an essential difference being made in the hardness of the hammer for the high tones. The resonance of sound is obtained by means of boxes of thin wood immediately behind the tuning forks. The lower tones are produced by spiral wires similar to those used as substitutes for bells in common clocks. Some of the notes in this instrument are very sweet and of considerable volume. There appears, however, some difficulties to be overcome, such as want of volume of tone in the extremities of the scale, limited range, and the different character of sound from the wires; all of which the inventor believes to be surmountable.

Printing Presses.—Several interesting improvements in printing presses and inking machines have been patented.

One which presents much novelty and has been fairly tested as to utility, is a rotary form of press. It is affirmed that this press has produced upon a trial experiment, twenty thousand copies an hour. The feature of the press will be readily comprehended from the preamble to the specification, as follows:

"My improvements are applied to that class of printing presses in which the form of types is arranged on the surface of a cylinder, with a series of impression cylinders, inking rollers, &c., arranged around it, so that by its rotation the types are successively inked and give their impression to the sheets of paper as they are fed in by the impression cylinders, the number of sheets to be printed by one revolution of the cylindrical bed depending on the number of impression cylinders arranged around it; the number of impression cylinders being governed by the diameter that carries the types and the distance between the impression cylinders.

The nature of the first part of my invention consists in arranging the form or forms of types on a segment of a cylinder, while the other portion of its surface is employed to distribute the ink, and therefore answering the purpose of a distributing table.

The second part of my invention consists in giving to the inking rollers, which are arranged in sets around the cylindrical form and distributing table, and also to the transferring roller of the inking apparatus, a motion in and out, or towards and from the axis of the cylinder around which they are arranged, so that they may make pressure on the cylindrical distributing table as it passes under them to distribute the ink, and be thrown out sufficiently far from the centre to transfer the ink to the forms of types, as the face of the types must be the segment of a larger cylinder than the segment which forms the distributing table, that this, (the distributing table) may not ink the impression cylinders when passing by them.

The third part of my invention relates to the inking apparatus and consists in giving to the ductor, or fountain roller that takes the ink from the fountain, a slow continuous rotary, instead of an intermitting motion as heretofore, so that the ink shall be regularly transmitted to the taking roller, and thence to the distributing roller, &c.; and also in connecting the arbor of this ductor or fountain roller with the mechanism that gives to it the slow rotary motion by means of a ratchet that it (the ductor roller) may be turned forward when desired to alter the supply of ink.

And the last part of my invention relates to the method of securing and retaining the types on the cylindrical bed, by means of column rules which are thicker at the outer than at the inner edge, so that the faces of any two of them shall be parallel with each other, or nearly so, to hold the column of types as tight at the top as at the base, the said rules being made with projections from the lower edge, to fit in rebated grooves in the bed, so that the columns of types, with the rules separating them, may be pressed together by screws at the side of the bed, in the usual manner of securing types, and thus secure and hold the form of types on a cylindrical surface, as effectually as on a flat surface; this important object having long been essayed in various ways, but never before to my knowledge, successfully attained."

Printed Floor Cloths.—An interesting improvement in the art of printing floor cloths has been patented. In the common printed carpets the figures are very rough in appearance, and although designed to imitate the figures upon woven carpet, yet the imitation entirely fails, from the hard outlines given by the printing blocks. The improved printed carpet can with difficulty be distinguished from woollen carpets. By a simple contrivance of shifting the printing blocks, the sharpness of the outlines is removed, and the figures appear to be raised and soft.

SURGERY.

Number of patents granted, 17.

Under this class are included many inventions not strictly of a surgical character, such as machines for exercising, inventions for artificial incubation, and subjects of a physiological character.

Several patents have been granted for exercising machines, under the appellation of swings, baby-jumpers, &c. In the former the object has been to enable the person to swing himself with ease, and in the latter to give salutary and pleasing exercise to infants and young children by suspending them in a frame or basket, hung upon springs, so that a slight touch of the foot upon the floor will cause a considerable upward movement and vibration of the machine.

Inhalation of Ether.—This discovery and invention patented in 1846, and noticed in the report for that year, has circulated through the civilized world with greater rapidity than any other improvement of the day. Numerous attempts have been made, in England and on the continent of Europe, to claim priority in this invention, but thus far the entire merit of originality and priority belongs to our own countrymen.

During the last year, experiments have been extensively prosecuted in Paris, on the inhalation of ether by animals, and have led to interesting results. M. Flourens observes, from his investigations, that ether acts first upon the cerebrum, and disturbs the intellect; then upon the cerebellum, affecting the equilibrium of movement; next upon the spinal cord, when it extinguishes successively sensibility and the power of motion; and, finally, upon the medulla oblongata, when it extinguishes life. In his late experiments the action of ether has been pushed to the extinction of life.

M. Flourens, in order to compare the effects with those of asphyxia, subjected two dogs to the simplest kind of asphyxia produced by the gradual consumption of the oxygen contained in a given volume of atmospheric air. When the asphyxia had reached the required point, the spinal marrow, exposed, showed no signs of feeling when cut or lacerated, and only feeble muscular contractions on pinching the motor portion. M. Flourens hence infers that there is a marked analogy between etherization and asphyxia. But in ordinary asphyxia, the nervous system loses its forces under the action of the black blood, the blood deprived of oxygen; and in etherization this takes place at first, under the quiet influence of the singular agent to which it is subjected.—*Silliman's Jour. July, p.* 138.

A patent has been granted for an apparatus for inhaling either. It has been found that the vapor of ether to produce the proper effects upon the system must be mixed with atmospheric air, and as the mixture is imperfectly made in the ordinary mode of inhaling, the apparatus in question renders the operation easy and certain. The instrument is simple in its construction. Its principal feature is in the arrangement of a valve which admits a current of atmospheric air to be mixed with the vapor of ether.

New substitute for ether.—Professor Simpson, of Edinburgh, has, in the chloroform, or trichloride of formyle, discovered an agent which more rapidly, and without communicating any offensive odor to the clothes of the patient, produces entire insensibility. No inhaler or instrument of any kind is necessary. A few drops put on a handkerchief and thus applied to the mouth and nostrils produces the desired effect in a few seconds. Professor Simpson has brought his discovery before the Medico-Chirurgical Society of Edinburgh, and it has been tried within the last ten days at most of the hospitals in London with complete success. At all these experiments the most serious operations in surgery were performed without pain to the patient, and there was no disagreeable smell, as when ether is used—no coughing or irritation of the air passages, or any thing to show that the patient felt inconvenience from the administration of the chloroform.—*English Newspaper.*

ARTIFICIAL INCUBATION.

The operation of hatching chickens by artificial heat is much more extensively practised in Europe than in this country, though of late years the traffic in such business has increased. Two patents have been granted for modes of artificial incubation, the point aimed at in both being to imitate as clearly as possible the circumstances of nature. A good idea of the invention and its objects may be gathered from a short preamble to one of the specifications, as follows:

"Heretofore, in arranging apparatus for the hatching of eggs by artificial incubation, it has been usual so to construct the same that the eggs are placed in a heated atmosphere, of a temperature which is thought the best for the purpose, so that the whole surface of each egg has heretofore been subjected to the same temperature, which I have discovered, after numerous experiments, is highly injurious, and only a very low per centage of the eggs submitted to artificial incubation can by such means be hatched, and I attribute that result to the evaporation of too much of the fluid of the egg. It will be found, and it is a well known fact, that the germ of the egg floats at the upper part of the egg, and the bird, in natural incubation, applies the direct heat of the body to that part of the egg, and the lower part of the egg is comparatively at a much lower temperature than the upper part where the germ is. In addition to which, the bird often leaves the nest for a time, by which each egg is more or less ventilated.

"Now the object of the first part of the invention is so to arrange apparatus for artificial incubation that the heat may be contact heat from above, whilst the lower surface of the eggs are kept comparatively at a low temperature, and by such means to imitate nature as nearly as may be. I would remark that the arrangement of apparatus for obtaining the requisite heat from above, to eggs, for carrying on the process of artificial incubation according to my invention, may be varied; and therefore, although I shall hereafter describe an arrangement of apparatus such as I have found fully to answer, and is what I believe to be the best for the purpose, I do not confine myself thereto so long as the peculiar mode of carrying on the process of artificial incubation by top contact heat be retained.

"The second part of my invention relates to the arrangement of apparatus to serve the purpose of the mother in imparting warmth to the young bird, and consists of circulating heated fluids through flexible pipes, so that the young birds can pass under and press themselves against such heated flexible pipes or surfaces; and such an apparatus will be found to offer a like mode of applying warmth to the young to that which is offered by the mother; and the young having a yielding warm surface above, against which they can press themselves, they will not be found to huddle together as has been heretofore very commonly the case in bringing up young birds; and such huddling together renders the young very weakly and tender, and very few are raised to maturity."

In concluding this imperfect view of some of the notable inventions of the past year, your examiner may be permitted to remark, that he has omitted to mention many inventions of obvious value and interest, for want of time.

Should the embarrassed condition of your examining corps be relieved, so as to allow a more patient investigation of the subjects before them, the preparation of their reports would be greatly facilitated, and the striking features of all important and interesting inventions faithfully delineated. As it is, your Examiner feels that he has not done justice to such topics as have been embraced in this report, and trusts that due allowance will be made for its imperfection.

Respectfully submitted,
CHAS. G. PAGE.
Examiner of Patents

E.

Report of W. P. N. Fitzgerald, Examiner of Patents.

To Hon. Edmund Burke,
Commissioner of Patents.

Sir,—In accordance with the established usage of this office, I respectfully submit to you the following report upon the progress of the arts, so far as they have come officially under my consideration, during the past year, and upon the progress and condition of business at my desk.

At the time this office was committed to your charge, its business had already increased to such a degree that it was no longer in the power of the examining corps to keep pace with it. Applications had already accumulated, which the most strenuous efforts could not diminish, and the close of the first year found one hundred applications upon my desk unexamined, and about the same number were awaiting my action at the close of the second, and the unparalleled increase of business during the last year has swelled my list of unexamined applications to three hundred and fifty-three. As applications accumulate, a great variety of miscellaneous business connected with them rapidly springs up, and increases, occupying much of the time of the examining corps and rendering it impossible to make that progress which would be attained if an accumulation of business did not exist. Thus, the very fact of an accumulation of business becomes one of the most aggravated causes of accumulation, and the more there is to do, the greater the obstacles in the way of its accomplishment. It may be safely asserted that the miscellaneous business arising out of the great accumulation of applications is nearly equal to all the business devolving upon examiners and assistants four or five years ago; and to bring up the business now before my assistant and myself, would tax to their utmost the energies of two examiners and two assistants.

In giving the number of unexamined applications before me, none are noticed except those which are on my desk—no allowance being made for the numerous applications in the hands of agents and applicants for amendment, or the still more numerous class of rejected applications which are liable at any time to be again called up before the office under modified forms for re-examinations. These cases being taken into account, it at once appears that the back business of my desk would give full occupation for one examiner and one assistant for at least one year.

Delays are always particularly annoying to applicants for patents, but circumstances are often connected with them of a character peculiarly vexatious and expensive. It frequently happens that after the filing of an application, and before its examination is possible, other applications of a similar character are filed, and when they finally come up for examination it is often found that two, three, and sometimes four are in conflict with each other—requiring interferences to be declared, voluminous testimony to be taken, hearings to be had—still longer delays, great expenses, and not unfrequently hotly contested appeals. All of which would have been avoided by prompt action upon applications when filed. These proceedings which the accumulation of business has rendered frequent, have greatly embarrassed the business of the office and obstructed its progress.

In both of my preceding reports I had the pleasure of stating that no appeal had been taken from the decision of any case referred to my desk; but within the past year four appeals have been taken from such decisions and contested with an unusual degree of determination and pertinacity; but in every instance the decision of the office has been fully sustained and affirmed by the chief justice of the district, and it is believed that the results will deter others from taking appeals and embarrassing the office, when there is no reasonable ground for alleging error, as the hope can no longer be entertained that its decisions will be reversed without such grounds. When there is a conflict between the claims of two or more individuals, perfect impartiality is aimed at, and the utmost care is taken to decide between them, in the manner dictated by justice and the laws governing the action of this office; and a close approximation to right is the more easily attained from the fact that the parties are seldom known either to the commissioner or to the examiner, and a decision is therefore arrived at upon the merits of the case, without any of those disturbing prejudices or prepossessions which might be suspected to arise from a previous acquaintance with the parties. When a single party is before the office claiming letters patent, every thing receives the most favorable construction for him which it can bear, and he has all the benefit derivable from a sincere desire to grant his petition, if it can be done in accordance with law. If, therefore, errors are committed, after the careful presentation and examination of a case, they would naturally be in favor of the applicant, and would seldom furnish any just ground of appeal. None of the interests of the examiner can possibly be involved, and it very seldom occurs that even the face of the applicant is known to him, and he is therefore free from those influences which so often warp the judgment, and is left at liberty to pursue the course pointed out by his best judgment, and by doing his duty, to secure for himself the reputation of a faithful and efficient officer. To pursue a different course, would be doing wrong without temptation; and any examiner who would not follow the path of duty from principle, would be urged to it by the exercise of common sense and the sentiment of self-preservation. It appears, therefore, that causes of appeal can seldom occur, and it is believed that the past history of this office in this particular will exercise a favorable influence upon the future action of applicants and their advisers. It is difficult to imagine any tribunal that could be more inclined to deal liberally with inventors than an office constituted as this is, for the sole purpose of fostering the arts and extending encouragement and protection to all those whose inventive genius and patient perseverance are successfully devoted to the amelioration of the condition of man by further and more varied applications of science to the useful arts.

The progress of invention during the past year is evinced not only by the great increase of applications for patents, but still further by the fact that a greater proportion of these applications present features of novelty than of those presented during the preceding year. The number of applications referred to me for examination during the past year is seven hundred and forty-four; the number approved and passed at my desk is two hundred and seventy-five; and the number of rejections is three hundred and thirteen. Some applications have under modified forms been rejected more than once, and therefore the above number of rejections exceeds the number of rejected applications. By reference to former reports it will be perceived that the number of applications referred to one examiner the last year is about equal to the number referred to both, even so recently as 1842.

And to this should be added the miscellaneous business arising out of the causes herein before noticed.

The following eleven of the twenty-two classes into which applications are divided at this office, are committed to my charge, viz:

1st. Metalurgy and manufactures in metals.

2nd. Manufacture of fibrous and textile fabrics, and all machinery therefor.

3rd. Steam, and other gas engines.

4th. Navigation—comprehending naval architecture, propellers, marine implements, &c. &c.

5th. Civil engineering and architecture.

6th. Land conveyance—comprehending all kinds of vehicles and implements of travel and transportation by land.

7th. Mills—comprehending all kinds of machinery for grinding and crushing, horse powers, and mechanical movement generally.

8th. Machinery for working in lumber—comprehending saw-mills, planing machines, stave machines, shingle machines, boring and mortising machines, and the various implements used therein, &c. &c.

9th. Fire arms, and implements of war—comprehending ordnance, all kinds of weapons, shot, &c., with the manufacture of the same.

10th. Hydraulics and pneumatics, comprehending hydraulic engines, water-wheels, wind-mills, machinery for raising water, fire engines, filters, &c. &c.

11th. Miscellaneous—consisting of such applications as are not comprehended in any other classes.

These several classes I shall consider in the order above indicated, reviewing as I proceed, the more prominent and unimportant improvements in each which have come officially under my observation during the past year.

METALURGY, AND MANUFACTURE IN METALS.

These important branches of the arts have received during the past year the attention to which they are justly entitled, and many improvements have been made and patented, and numerous applications still remain unexamined. The nature of these improvements will develope themselves as we proceed.

Gold.—But one patent has been granted the past year, for separating gold from the sand and other impurities which are found mingled with it. The process is wholly mechanicel, and is intended to separate gold, which is not chemically combined with other substances, but simply mixed with them. This is the condition in which gold is usually found. It does not, like iron, copper and other baser metals, easily combine with other substances, and hence the fact that it is usually found pure, and simply mingled with foreign substances. The apparatus patented does not differ from those heretofore used sufficiently to render a particular description of it necessary or interesting, and it will be sufficiently understood by a perusal of the claim.

Copper.—One patent has been granted within the past year for an improved process of reducing copper ores. This metal very readily combines with many other substances, and is therefore unlike gold, usually found in combination, and requiring a severe chemical process to effect its separation. It is sometimes found nearly pure—but this is an exception to the general rule. The reduction of copper ores is a matter of considerable difficulty, and the process patented to a foreigner may be of importance, and it is therefore presented in the following extract:

"The object of my invention is to facilitate the smelting of copper ores, and it consists in the application of iron with alkaline substances to the smelting such ores and the decomposing and disintegrating by means of water the products obtained by such application.

"When I operate upon ores containing less than twenty per cent. of copper, and more sulphur than two parts by weight to four parts by weight of copper, I commence by treating them in the same manner as is usually practised by smelters, vide-licet, by first calcining them for about twelve hours, in an ordinary calcining furnace, and then removing them to a smelting furnace known by smelters as an ore furnace, for the purpose of fusing them, adding, if necessary, the usual fluxes. When well fused, I skim off the slag and run out the residue either into sand moulds or into water, forming, at this point what is technically known as 'coarse metal.'

"When I operate upon ores containing less than twenty per cent., and a smaller proportion of sulphur than two parts by weight to four parts by weight of copper, I mix with them other ores containing sulphur in larger proportions, so as to make the average proportion of sulphur in the whole reach two parts by weight to four parts by weight of copper, and proceed to calcine and fuse as before stated.

"When the ores by themselves, or by mixture as aforesaid with other ores, contain a greater proportion of sulphur than one part by weight to four parts by weight of copper, and also more than twenty per cent. of copper, I omit both the calcining and fusing processes before described, and commence by treating such ores as hereafter directed for treating 'coarse metal.' I shall designate the product in the two first cases, and the ore in the last case, as 'coarse metal.' To every ten ton weight of this I add fifty-six pounds of soda ash (containing about fifty per cent. of alkali,) and fifty-six pounds of slaked lime, and transfer the whole to a fusing, or, what is termed by smelters a metal furnace, and fuse the mass. When the whole is in a state of fusion, I skim off any slag which may have formed, and then add one hundred weight of scrap iron to every ton of the 'coarse metal,' and I disperse the iron over the surface of the melted mass as equally as possible, and close the door of the furnace until the whole is melted. I then stir the whole well and rapidly with a rabble, and immediately tap the furnace and run the mass into sand moulds. As soon as the mass is sufficiently set to be removed, I put it into a shallow pit containing water enough to cover the whole, and allow it to remain therein from two or three hours, by which time the mass will have become partially decomposed and disintegrated. I then run off the excess of water and remove the mass, and allow it to remain in a heap in the moist state until the whole becomes reduced into a fine powder, which I have generally found to take about twenty-four hours. I then wash the powder by any convenient means. I have succeeded well by using a large box, having a double perforated bottom of wood; between the perforated boards is placed a metallic gauze wire of from twenty-five to thirty-five meshes to the inch. I place this box in what is known by smelters as a tapping pit of water, having first provided a vent from the pit below the level of the bottom of the box; over the aperture of this vent is a metallic gauze of from sixty to seventy meshes to the inch. I then introduce a quantity of the powder to be washed into the box, and, having stopped the vent, I pour water in until the box is full. I then open the vent and allow the water to run off. I repeat this process twice. I now remove the powder to an ordinary calcining furnace, and I apply heat very moderately at first, increasing it gradually for twenty hours, so as that at the end of this time it should reach a bright yellow heat. This yellow heat, I continue for six hours longer, taking care to stop short of such a heat as would cake or fuse the powder, and I keep the powder regularly stirred at intervals during the whole time. I now remove the powder from the calcining furnace to a fusing or 'metal furnace,' taking the precaution to sprinkle it with water when drawn from the calcining furnace as is usually practised, and to every ton weight of this powder I add in the fusing furnace about one hundred weight of anthracite coal, also in powder, and ten pounds of sand, adding, if I find it difficult to fuse, lime or flour spar as a flux. When the whole is well fused, I skim off the slag and tap the furnace into sand. The product thus run out I have generally found to be fit for the refining furnace, and I subsequently refine it in the usual manner; but if, as in practice will sometimes happen, a small portion of the product should be regulus, this regulus, which is rich in copper, I roast and afterwards refine. The slag skimmed off as above contains copper, and may be employed as usual with charges in the ore furnace as a flux."

Iron.—Three patents have been granted for obtaining iron from the ores—one of which was a re-issue of a former patent, and therefore does not require notice.

The first of these patents is for reducing ores in the ordinary cupola furnace, and consists of little else than the addition of a constant jet of steam upon the mass, while undergoing the process usual in such furnaces. The patentee considers the improvement which he has made of great importance, but it has not yet been thoroughly tested.

The other patent under this head, is for a mode of producing malleable bar iron directly from the ore. The process and apparatus heretofore resorted to in bloomeries, for preparing the loup or bloom for the trip-hammer, are attended with many disadvantages. The forge fire is such that all the ore and other materials for the loup cannot be placed upon it at once—but as large a mass as can be accommodated is placed upon the fire, and as the impurities are driven off, and the mass diminishes, another portion of the ore and other materials are added, and this is repeated until the loup is formed and prepared for the hammer. In this process, as the forge is open on all sides, it will be perceived that the outside of the mass is constantly exposed to the atmosphere, which cools the mass, and otherwise much retards the process, rendering much time and fuel necessary—and as the mass is partially reduced, the addition of cold materials produces a similar effect. These new materials require additional time for reduction, and the same is true of the succeeding additions, and it is therefore evident that those portions of the ore, which were earliest placed upon the fire, are kept there much longer than is necessary, and are in danger of receiving injury therefrom, and the incongruous mass is with great difficulty brought into the same condition, and prepared for the hammer.

To obviate these inconveniences, the patentee in question prepares a close chamber for the reception of the charge, and of sufficient size to receive the whole charge at once; the upper part of the charge is supported, in some degree, by moveable bars extending across the chamber, and there are suitable doors which may be opened when necessary, for the reception of the charge, for the working of the loup, and for removing it when ready for the hammer. When the loup is nearly reduced, a new charge may be introduced, and made to rest upon the bars above mentioned, so as to receive all the benefit derivable from the heat which would otherwise be lost.

The advantages of these improvements appear obvious, and they are said to be in successful operation, effecting a great saving of time and fuel, and increasing the quantity and inproving the quality of the iron.

Steel.—Letters patent have been granted for improvements in ovens or furnaces for the manufacture of steel. The improvement consists in so arranging the flues about the oven, that the heat shall be more equally and directly applied and economised. The oven and furnace do not greatly differ from those in use, but every improvement in this branch of manufactures is important—and the invention in question seems calculated to produce favorable results.

A few patents have been granted for improvements in furnaces and forges within the year, but they are unimportant.

Letters patent have also been granted for an improvement in welding cast iron to steel or wrought iron. The general principle upon which this mode of welding is effected has long been known and reduced to practice—and the patent in question was granted for a slight improvement in the mode of applying the cast iron.

An ingenious and convenient mode of moulding and casting door plates has been patented within the year. The improvement is in the pattern. The pattern, except the letters, is in one piece, having the general form of the plate; but so constructed that blocks, having each one of the letters of the alphabet upon it, or a blank, can be slipped in and changed at pleasure, making a complete pattern for the plate and name required; and immediately after use the letter blocks can be changed, and the pattern prepared for another name. The convenience of this device is obvious.

Rolling.—Letters patent have been granted for improved machinery for twisting and rolling iron into bars. The process of manufacture, and advantages of this kind of iron, as well as the nature of the machinery used in its manufacture, are fully set forth in the following extract:

"In the manufacture of iron, either by rolling or hammering, the fibres are all drawn longitudinally, which, for the rails of rail roads, for the tires of rail road wheels, and a variety of other purposes, renders it liable to break off in thin leaves or scales, or to split lengthwise, this state of things being common in the two instances specified. The object of my invention is to treat the iron, either in the original manufacture thereof, or afterwards, as to avoid this defect, and thereby render the iron for these purposes more durable, by laying the fibres in such form and direction as to prevent it from scaling off or splitting; and my invention consists in twisting the iron, in, or before, or after the operation of rolling or hammering, so that the fibres shall wind around one another, in manner somewhat similar to the fibres of hemp in a twisted rope or strand.

"And the second part of my invention relates to the machinery by which I carry into effect my improved process, and consists in combining two or more sets of rollers, one or both of which are to be draw rollers, and one set turning in the usual permanent bearings, and the other set or sets working in a frame or chuck that rotates on an axis at right angles to the axis of the rollers to twist the bar of iron between the two sets of rollers. To en ble any one skilled in the art to apply my improved process of treating iron, and to construct and use the machine which I have invented therefor, I will describe the mode of procedure which I have essayed as well as the manner of constructing and using the machine therefor.

"The bloom of iron, or a bar previously formed, is taken while in a heated state, and twisted while undergoing the operation of hammering, which may be done by securing one end of the bloom or bar in a clamp and rotating it while the hammer rests on the other end, or by securing the two ends in separate clamps and turning one of them, or both, in opposite directions until the required twist has been given and then subjecting it to the operation of hammering. But when the bar is to be drawn by rolling, it is to undergo the operation of twisting while passing between the rollers, or after it has passed between one set and before it passes between the second set. And when it is twisted on its way to the rollers one end of the bar may be secured to a clamp, which is to be rotated as the bar passes between the draw rollers.

"As the bars thus prepared are in most instances to be re-worked to receive the required form or forms, according to the purposes to which they are to be applied, it will be evident that they may be twisted as they pass from the hammer or the rollers, instead of giving the twist before the hammering or rolling; and to effect this the end of the bar may be clamped as it leaves the hammer or rollers, and the required twist given; but it is better to give the twist before the iron has undergone the operation of rolling or hammering, as it is then more highly heated, and the fibres will not be so severely strained as they would be after the metal has been partly cooled.

"When iron has been treated and worked according to this process the fibres instead of running in the bar longitudinarily in straight lines, will run in the direction of a helix, gradually approaching to a straight line from the circumference to the axis of the bar, so that when used for making tires, or for other analogous purposes, the bar will be prevented from splitting along its length by the tenacity of the fibres which cross the bar in the direction of a helix instead of the mere adhesion of the fibres together; and when used for the rails of rail roads or similar purposes, none of the fibres can be separated from the mass longitudinally, as heretofore, nor can the iron be stripped off in scales, until the fibres have been cut off on each side, for by their direction they pass diagonally from one side over the surface and down the other side, whereby they are completely tied together."

Letters patent have also been granted for forming pen barrels by drawing—a process similar to that of making wire: and another for forming horse shoes with dies, &c. The novelty in both these patents is very slight, and does not require particular attention.

Files.—Within the last year letters patent have been granted for a machine for cutting files. It is somewhat complicated, and cannot well be described in this place. The cutting is not effected by blows but by pressure, and the object of the patentee is to increase the pressure upon the chisels, in proportion to the resistance met with, whether the resistance arise from a variety of width, or hardness of the blank. The varied resistances arising from differences of width of the blank, as there is a regularity in the shape of the file, are easily met; but those which arise from its varying hardness, as it is not known at what points they will occur, are very difficult to contend with by any machinery at present known.

Spiral Knives.—Two patents have been granted for machinery for grinding spiral knives—one of which was a re-issue and has heretofore been noticed. The other machine grinds the knives in the direction of their length while attached to the stock—the stock traversing endwise, and the shaft of the grinder as it revolves having a vibrating endwise motion to preserve the smoothness of the surface of the stone. As a vast number of these knives are in use in every part of the country for various purposes, this machine promises great usefulness.

Sheet Metal.—Several patents have been granted within the year for the improvements in the machinery for working in sheet metal. This class of machinery is of a simple character and much has heretofore been done to improve it. Little therefore remains to be done except to refine and perfect the various parts of the machine without very prominent changes of principle—and although these refinements are often of great practical usefulness—yet it does not appear necessary in this place to go into a minute description of them. Such should be reserved for inventions of a more striking and original character.

Letters patent have been granted for an improved machine for setting and filing saws. The machine possesses merit, but it would be difficult in this place, without drawings, to give an idea of its operation.

Letters patent have also been granted for a portable machine for planing metals. This machine differs but little in principle from the machines already in use, but its portable character is such as to give it peculiar advantages and cause it to be used in shops and factories where other planing machines are already to be found. It is susceptible of being attached temporarily to a bench at any desirable point, or directly to the thing to be operated upon, where it performs its duty and may afterwards be removed to any other place, where it may be needed. It will readily be perceived that this machine is an important auxiliary to ordinary planing machines; and its great usefulness in machine shops generally is equally obvious.

Trip Hammers.—Three patents have been granted within the year for improvements in trip hammers—one of which is a re-issue of a patent already noticed in former reports, and another for additional improvements of the same. The hammer in question is attached directly to the piston rod of the steam engine which operates it. The thickness of the mass to be hammered, or other considerations may render it desirable that the hammer should rise higher at one stroke than at another—this variation of stroke is regulated by the opening of the eduction valve of the steam cylinder. This valve may be operated by hand or by the machine itself—and the additional improvement above mentioned has reference to the operation of the valve by the machine. The valve is controlled by a series of springs which in their turn are controlled by a kind of trigger attached to the piston rod. When the hammer strikes, the momentum of the heavy end of the trigger causes it to descend—elevating its short end and forcing it against the machinery which closes the eduction valve, and the hammer is immediately raised. The machinery is conveniently adjustable. As the hammer arises carrying the trigger with it—when it arrives at the point to which by the adjustment it is intended to rise, the short end of the trigger strikes a pin throwing up its long end and relieving the parts which have held the valve closed, upon which the valve opens, the steam escapes and the hammer falls—the trigger remaining in the same position till the hammer strikes—when the momentum of the long end of the trigger causes it to descend and close the eduction valve as before. The device is ingenious and useful, rendering the machine not only self-acting but easily giving any desirable variety of stroke.

The other trip hammer for which letters patent were granted, has the general appearance of the ordinary trip hammer, being attached to a lever or handle working upon trunions. This hammer is operated by steam—and the valves and other parts are so arranged that the attendant can regulate or immediately arrest the action of the hammer at every point. The spring which aids to throw down the hammer after it is raised is a steam spring communicating with the boiler, thus increasing in strength in proportion to the power operating on the hammer. The apparatus appears sufficiently simple and efficient, and will doubtless be found useful.

Tools.—Letters patent have been granted for several inventions under this head, comprehending hammers, chisels, wrenches, augers, bit stocks, drills, &c. These patents generally do not require particular description, but one or two of them deserve notice. The improvement in augers above-mentioned consists in a modification of the twist. All who are acquainted with boring are aware that one of the greatest obstacles to be overcome arises from the clogging of the chips, which often renders it necessary to withdraw the auger for clearing. Many devices have been resorted to, for the purpose of enabling the auger to clear itself, and with more or less success. The plan adopted by the patentee is to add to the other improvements a constant variation in the twist—so as to leave greater space between the threads for the chips at the upper end of the twist than at the lower. Thus the chips being less compressed will the more readily rise and the auger will clear itself.

The bit-stock mentioned above as patented, is in its general character and appearance like those in common use. The bit when set in the stock is usually held by a spring catch. Although this catch is in general sufficient to prevent the bit from falling out, yet it does not hold it firmly—the bit readily shaking in the socket. Instead of this spring catch therefore the patentee uses a ring, which may be turned by the thumb and finger on the stock, having a portion of the thread of a screw on the interior, which as it is turned, catches into the notch in the shank of the bit—at once holding it and drawing it tight up to the shoulder where it becomes immovable.

Metallic Pipe.—Two patents have been granted for improvements in the manufacture of metallic pipe. The first for improvements in machinery for welding iron pipe much resembles some that have been used before. It need not here be described. It presents but little novelty, though that little appears to be important. It has been patented in England and may be found described in the English journals.

The other patent is for improvements in machinery for making pipe of lead or other similar metal. One of the most approved modes of manufacturing lead pipe—introduced but a few years ago—is to place the melted lead in a strong cylinder having a die and core of proper dimensions for the exterior and interior of the pipe—the core being supported by a bridge at the mouth of the die. At the other end of the cylinder is a piston operated by an hydraulic press. After the metal has been allowed to "set," the power of the press is brought upon the piston, and the lead is forced forward through the bridge which separates it into several parts, which by the great pressure applied re-unite and pass out of the cylinder between the die and the core in the form of pipe. No more effective and satisfactory mode of manufacturing lead pipe has heretofore been known. But it is subject to one great objection. The power required is almost incredible, and it is with great difficulty that the parts can be made of sufficient strength to resist the force applied. Any improvement therefore upon this kind of machinery which will cause it to be effective with diminished force is of primary importance. The lead when "set" has not acquired its usual hardness—but is so nearly a semi-fluid that great pressure upon it by the piston causes the lead to press in all directions—like a fluid with nearly equal force. The pressure therefore of the lead upon the sides of the cylinder is nearly equal to the pressure of the piston—and when we consider the immense power applied, and that the whole mass must be forced forward until it has passed through the die—the resistance arising from the friction of the mass moving along the sides of the cylinder will readily be understood to be one of the most serious obstacles to be overcome. The invention in question entirely obviates the necessity of forcing the mass forwards, and therefore avoids the greatest obstacle heretofore encountered; and this is done by an improvement of the simplest character. The die instead of being placed as heretofore in the head of the cylinder, requiring the lead to be forced along the sides of the cylinder to it—is placed in the piston head and moved forward upon the lead—so that the mass of lead—relatively to the cylinder—has no motion and consequently makes no friction nor resistance—and all the power required is simply that which is necessary to cause the lead to pass out between the die and core to form the pipe. This improvement is of very great importance, as it brings relief to lead pipe machinery at the very point where it was most seriously needed. There are other incidents and minor advantages, possessed by this machine over others, which will be easily understood and which it is unnecessary to set forth.

Letters patent have been granted within the year for a type machine for the manufacture of type from malleable metal. This machine in its general characteristics is like a nail or spike machine. It roles the wire into a flat rod which is received into proper dies where it is held, cut off, and punched into the general form of type, and a die of proper form resembling a header die is brought up against the end of it forming the required letter—when it is discharged and another blank received. Those acquainted with spike machinery will easily understand the modifications necessary for forming type, and that there would be but little novelty in such a machine.

Two patents have been granted for improvements in rivets, for uniting the parts of bands for pullies. The object of one improvement being to prevent the band from slipping at the point of union, by an improved form of the rivet head, and the other to give a novel form to the shank to preserve the strength of the band, at that point. Both improvements are slight in themselves, but seem to promise useful results.

A patent has been granted for improvements in machinery for manufacturing metallic suspender buttons. The blanks are put into this machine and without further handling the parts are punched, placed together and finished. This machine manifests considerable ingenuity but could not in this place be intelligibly described.

One patent has been granted for dies for cutting the threads of screws on screw bolts. These dies have a series of teeth each calculated to cut a little deeper than the preceding, and in proper form for cutting the grooves between the threads. The teeth are formed at such distances apart as to follow each in the trace of the other as the cutting proceeds and the blank advances. The teeth are cut away back of their points to allow the edges or points only to touch the blank, and an ample throat is made for the discharge of the chips. The die is made in one piece and cuts the largest screws with great perfection and by the application of a moderate degree of power.

By reference to my last report it will be perceived that the number of improvements in screw and nail machines patented the past year, bears but a small proportion to those patented in 1846; but it should be remarked that a great number of applications in this class are pending, which it has been impossible to reach, but which will soon come up for examination.

Locks, fastenings and hinges.—Some twenty patents have been granted the past year for improvements in the above subdivisions, but I must confine my remarks to but few of them. Some are complicated, and cannot here be described. Others resemble devices heretofore in use, so nearly that a description is unnecessary.

One of these patents is for a "chronometric lock," to be used when it is only necessary to open whatever is secured by it, at stated periods. Such locks have long been in use to a limited extent, and have a time piece so connected with them as to operate upon some part of the lock, at the appointed time, in such manner as to allow the bolt to be withdrawn, which cannot be done at any time before that at which the piece is set. The patent in question was therefore granted for a modification of those heretofore in use, and presents but little novelty, and with the foregoing remarks will be sufficiently understood by a perusal of the claim.

Several patents have been granted for improved fastenings for window-blinds—some of them are for catches, very nearly allied to those formerly in common use, but more simple and compact. Others are for improvements placed upon hinges for the same purpose, so combined as to hold the blind open or shut without causing strain upon the point of the hinge. One of them, for fastening the blind open, has a catch attached to the wall at the outer edge of the blind, a latch is attached to the blind, at the proper point to enter the catch, and the hinge is so constructed that the blind rises as it is opened sufficiently to elevate the latch over the catch in the wall, and when fully open falls, dropping the latch into the catch, rendering it impossible to unfasten the blind without lifting it up. To the hinge there is attached a lever by which the blind may be elevated whenever it is desirable to close it. This mode of fastening is very effective and places the strain at those points where it can be resisted with least injury to the parts.

Patents have also been granted for improvements in latches, knobs, &c., for doors, and for several devices for opening and closing them, but, without particularly describing these, I must hasten to the next class under my charge.

As the business of my desk is six months in arrears, it will be evident that the foregoing does not, by any means, present an adequate idea of the vast extent and variety of inventions in metalurgy, and manufactures in metals, developed within the past year—nor will it be possible, for the same reason, to do justice to any of the classes which remain to be discussed; but I shall be obliged to limit myself to the unsatisfactory shadowings which may be derived from unfinished investigations.

FIBROUS AND TEXTILE SUBSTANCES AND FABRICS.

Improvements are rapidly progressing in this extensive class of manufactures, and in the complicated and almost infinitely diversified machinery devoted thereto. Some evidence of this progress is furnished by the applications which have been examined and the patents which have been granted. It is unnecessary in this place to enumerate the various subdivisions of this class—they will appear in the course of its analysis.

Hemp Brakers.—Two patents have been granted within the year for improvements in hemp brakers, neither of which present any very striking novelty. Much ingenuity has heretofore been exercised, and perhaps many machines have been constructed upon sound principles. But the separation of the fibres of hemp and flax from the woody part of the stalk without breaking and injuring the fibre, is a task of great difficulty. When the machines heretofore known are used, it is perceived that more or less of the fibres are broken and become "tow," and hence the constant exertions on the part of inventors to make improvements which shall avoid this result; and very slight changes are often of great importance. At the point where the hemp is broken, it is important that it should not be rubbed or drawn across an edge, but after it is well broken, so that the hard part is loosened from the fibres it may be slightly rubbed without much injury. One of the patents above alluded to, has for its object the breaking of the hemp over a rest by a beater, and then drawing the broken part immediately away from the breaking wheel by the action of two beater wheels, which shake out the hard fragments without allowing the hemp to touch the breaker wheel, thus breaking and cleaning at once, and, as the inventor contends, without the usual injury to the fibres.

The other improvement is upon the old fashioned brake which breakes the hemp or flax, by placing it on a series of stationary blades and passing a set of moveable blades between them, carrying the flax or hemp along and breaking it. The invention has reference principally to the easy introduction and withdrawal of the hemp or flax in the process of breaking.

Cleaning Cotton.—Three patents have been granted during the year for improvements in machinery for cleaning cotton. One of these is for a slight improvement upon a machine heretofore patented by the same inventor. It does not affect the general character of the machine but extends simply to the beaters which are of wire gauze. A perusal of the claim is sufficient for an understanding of the invention.

In many machines for cleaning cotton, the principal parts are a hollow cone in nearly a horizontal position, with another cone working within it and having beaters upon its exterior for beating out the impurities. The cotton is admitted at the small end of the machine, and as it is cleaned passes towards the other end where it is discharged. In one of this class of machines patented within the year the beaters are so arranged in an inclined position upon the exterior of the inner cone, that while they clean the cotton in the usual way, they operate upon it in the manner of a screw and carry it steadily towards the end of the machine where it is discharged, thus securing a more equal and regular action of the machine upon the cotton.

Burring, Carding and Combing Wool.—Several patents have been granted within the year for improvements in machinery for these purposes. There has within a few years come into use a burring cylinder, composed of rings upon a shaft resembling very much the saw-cylinder of a cotton gin, with inclined notches, cut at intervals, in the outer edges of the rings thus forming teeth to hold the wool while the burrs are beaten off by a beater working nearly in contact with the cylinder. These notches in the first machine patented were formed with wide throats, wider than the opening leading to them. In consequence of this form, it is said that the wool clogs in the notches, and after being burred cannot easily be removed, and, conse quently, the usefulness of the cylinder, in other respects well calculated to effect its object, is much impaired. This difficulty has been overcome by making the notches of equal width from the mouth to the throat, by which improvement the cylinder holds the wool as well as before, and at the proper time is easily cleared.

The beater used on these machines consists of a cylinder with ribs extending out from its outer surface for beating off the burrs—these ribs have been placed parallel to the axis, and have also been made to wind spirally upon its surface. To the first kind of ribs objections were made, which were removed by the second; but while this removed one evil it was said to introduce another—to obviate which, and still retain the advantages of the spiral or inclined ribs, the ribs have been placed in zig-zag directions upon the surface of the beater cylinder.

A mode of constructing these beaters—equally applicable to the straight, spiral or zig-zag ribs—has also been patented, which secures to the beater great strength and lightness.

Beaters formed like saw-cylinders of cotton-gins have, for some years past, been known and in use—but in these it will readily be perceived that when in operation each successive tooth follows directly in the track of the preceding—and the spaces between the teeth all come directly after each other—and, consequently, the action of the beater is not equal upon all points of the burring cylinder. To avoid this imperfection the beater cylinder has been made solid, and grooves cut into its surface spirally, so as to make it resemble a screw with sharp threads. Longitudinal grooves are then cut in the surface of the cylinder across the threads already mentioned, forming the whole surface into teeth and spaces. As the grooves around the cylinder are spiral, it is readily perceived, that each tooth as the cylinder revolves will follow the space left between the two preceding teeth, and thus the action of the beater upon the burring cylinder will be equalized. A similar improvement for feed rollers, for this kind of machinery, has been patented within the year. Other improvements in burring and carding machinery have been made, but it is unnecessary further to dwell upon them, especially as it would be difficult to render them intelligible without drawings.

The oiling of wool for carding, heretofore and still practised, however necessary, is, of course, objectionable, in consequence of its influence upon the woven fabric; and letters patent have been granted within the year, for the use of steam instead of oil which is said to present all the advantages without any of the inconveniences of oil.

An ingenious and useful improvement in wool combing machines has also been patented. To obviate the inconveniences of other modes of construction, the comb teeth have been attached to belts and carried forward and around driving pullies or rollers. These belts, owing to their flexibility, furnish an imperfect support for the teeth. To obviate these inconveniences of the belt, a series of solid inflexible blocks, following each other closely, have been substituted, travelling like the belt, except at the ends where, without turning, they are pushed forward into the field of action, or in like manner are withdrawn from it. This improvement secures the important ends of firmness and perfect parallelism of the teeth.

Cotton Batting.—One patent has been granted for improvements in cotton batting. These improvements consist in placing upon the bat formed in the usual way, threads at short intervals, both lengthwise and crosswise of the bat, for the purpose of giving greater strength to the batting; and also in passing the batting, prior to glazing, between rollers moistened with water or other thin fluid. The batting is then glazed by any known process. By passing the batting between the moistened rollers, and then sizing it, a remarkable degree of strength is given to the sized surface; and by the union of the threads, with this mode of sizing, an article is produced which obviates the many evils which have heretofore arisen from want of strength.

Hats.—Several patents have been granted for improvements in machinery used in the manufacture of hats. This manufacture by machinery involves considerable difficulty, and much ingenuity has been exercised upon it for many years. Machines upon correct general principles have long since been constructed, which, presenting slight practical difficulties, have failed to perform, in a sufficiently perfect manner, the duties for which they were intended; and it is but recently that hat bodies have been produced in practical perfection by machinery. The differences between some of the machines heretofore known, and some of those recently patented, are very slight; but in this kind of machinery these slight changes often constitute the distinction between machines utterly useless and those of vast utility. One of the patents above alluded to, is for machinery for forming or placing the fibres for the hat upon the perforated cone, so that they shall be properly distributed and prepared for felting. The following extract will sufficiently set forth the characteristics of this machine:

"Our invention is for improvements on the method of forming hat bodies by throwing the fur or other fibres on to an exhausted perforated cone placed in front of a trunk or tunnel which receives the fur from the rotating brush or picker, and guides the delivery of it on to the perforated cone. Our first improvement consists in making the sides of this trunk of thin sheet metal, or other substance which can be readily and easily bent to the desired form, so that the aperture or mouth of the trunk which directs the deposit of the fur, etc., on to the perforated cone or former, can be changed at pleasure to increase or decrease the deposit of fur on any part of the former, as it may be desired, to increase or reduce the thickness of any part of the hat. This object, which is of great importance in the manufacture of hats, has been attempted by providing the mouth of the trunk with a jointed hood which can be depressed or elevated; but it is found in practice that this does not regulate this distribution so effectually as our improved method, for any desired curve can be given to the sides to give a gradual enlargement or contraction to any part.

"Our second improvement consists in making the top of the trunk so that the end towards the former can be depressed or elevated at pleasure, the back end being the axis of this motion, by means of which the mouth of the trunk can be adapted to any size of former, and yet have the top of the trunk present an unbroken plane, to avoid catching and retaining the fibres or the forming of eddies in the current of air that passes through the trunk, tending to interrupt the direct passage of the fibres from the brush to the former. The top being so formed as to embrace the pliable sides, that the upper part of the trunk may always be of the same size, irrespective of the position of the top.

"Our third improvement consists in providing the aperture at the back of the trunk, and below the feed rollers and brush, with a valve or shutter, for the purpose of closing the aperture to prevent the passage of a strong current of air through the trunk at the commencement of each operation, and until the perforated former is covered with a film of fibres, by means of which the forming of welts or air bubbles in the bat is effectually prevented. At the commencement of the operation, and before the perforations in the former are partly closed by the deposit of fibres, it will be obvious that the exhausting fan in the former will produce a much stronger current of air through the trunk than when the perforations are partly closed, and that therefore the fibres will be thrown on to the former at the commencement of the operation; this it is found by experience produces counter currents, which throw up the first film of fibres from the surface of the former, and thus forms welts or protuberances which are very injurious to the bat. But by closing the aperture at the back of the trunk, the fibres are at first deposited by a gentle current and pressure, and after a film completely surrounds the former, the opening of the valve or shutter admits the current, that the fibres may be thrown on with more force to complete the bat.

"And our fourth improvement consists in the employment of one, two, or more rollers, covered with cloth or like substance, below the feed rollers, the rotation of which, in connection with the brush, has the effect to brush, comb, or otherwise straighten the fibres before they are thrown by the brush and carried to the former."

Another of the above mentioned patents is for improvements in felting by machinery. The hat body is placed upon a perforated hollow cone, and another hollow cone is placed over it. Cloth should be wrapped around the hat body prior to placing the outer cone upon it. Steam is then admitted through the inner perforated cone to the hat body, while the outer cone is connected by a rod to a short crank upon a revolving shaft which gives it a vibrating motion on its axis, which effects the operation of felting.

Another of the above patents is for an apparatus for forming the brims of hats in finishing, and is made adjustable so as to adapt it to different sizes of hats and brims.

The last which I shall mention, is a patent for an apparatus for stretching the tips of hats preparatory to blocking. It consists mainly of a series of levers placed around a circle, their upper ends resting together and forming something like the frustum of a cone. The hat body, after felting, is placed upon these levers, the tip resting upon their ends, when by pressing a treddle or lever connected with them the ends of the levers are thrown out, stretching the tip to the degree desired.

Spinning.—A patent has been granted within the year for improvements in machinery for doubling and twisting thread. In this machine the bobbins with the thread to be doubled and twisted are placed upon spindles or pins upon a stationary frame, the ends of the threads are attached to a bar resting for the time being against rests on the frame, the loops of thread between the bobbins and the bar are passed over hooks upon a travelling carriage. The carriage is then run back the proper distance for the length of the thread required, drawing the thread from the bobbins, and as the ends of the threads are attached to the stationary bar upon the frame they are of course doubled. Each of the hooks in question has a pulley upon its shank with a band connected with the operative parts of the machine, and by proper clutching and shifting of bands the hooks are caused to revolve rapidly to give the required twist, after which the threads are cut near the bobbins and the bar is laid upon a reel, and by proper changes of gearing the carriage is run in, and the doubled and twisted thread wound upon the reel. After this the same process is to be repeated. The further details of this machine cannot be rendered intelligible in this report.

Letters patent have also been granted for devices for changing the speed of drawing heads. The object is effected by connecting the pullies through which the motion is given to the cog wheels, which communicate motion to the drawing rollers by concentric hollow cylinders on the same shaft and passing over or through each other -each pulley is thus connected with a pinion which will give a different speed from the others and nothing is therefore necessary to change the speed but to change the belt from one pulley to another without any modification of the driving power.

Letters patent have also been granted for very ingenious and apparently very important improvements in spinning frames, which I should be glad to present in this report, but the complicated character of the machinery renders it impossible. Many of the movements are like those of the self-acting mule, and in some respects seem calculated to produce similar results. For a full knowledge of this machine reference must be had to the patent or to the records of this office.

Another patent has been granted for improvements in spinning frames which manifest great inventive genius, and promises very useful results. Its general character may be gathered from the following extract from the patent—though the details of a machine so complicated cannot in this place be rendered intelligible.

"My invention relates to the carding, condensing and spinning of fibrous substances, particularly wool, by a continuous series of operations constituting a combined machine, and the nature of my invention consists, first in giving to the first pair of draw rollers that receive the rovings from the condenser, an intermittent rotary motion when this is combined with the second and third pairs made with their peripheries in segments, with the segments of one set placed at right angles to the segments of the other so that when the second set are drawing the rolls or roving between them and the first pair that have an intermittent motion, the thread shall receive twist from the spindles to the second set, and when these have performed a portion of a revolution, equal to one segment, and liberate the rolls or rovings, the other pair begin to draw, the twist given to treads from the points of the spindle to the second pair is permitted to run up to the rollers that move with an intermittent motion that the rovings may be partially twisted the better to sustain the drawing operation.

"The second part of my invention consists in giving a reciprocating motion to the guides around which the roles or roving pass between the condenser and the first pair of draw rollers that have an intermittent motion, for the purpose of taking up the slack made by the continuous delivery of the condenser during the time that these rollers are not in motion.

"The third part of my invention consists in giving to the guides around which the rovings pass, an intermittent motion on their axis corresponding with the intermittent motion of the first pair of draw rollers, to prevent the breaking of the rovings by friction in passing around the guides.

"And the last part of my invention relates to the mode of regulating the amount of twist to be given to the threads, by varying the ratch of the two pairs of segment draw rollers, that is to say, by varying the distance between these two sets of rollers, which at the same time varies the distance between the lower pair of rollers and the points of the spindles, this being effected by mounting the lower pair of draw rollers on slides, so that by means of a rack and pinion they can be moved up or down the cog gearing which communicates motion from one of the pairs of segment rollers to the other, being connected by joint so as to retain the cog wheels at their true pitch, as the distance between the draw rollers is varied.

Cordage.—As nearly allied to the class of spinning machinery, it may be here noticed that two patents have been recently granted for improvements for machinery for the manufacture of cordage. One of the improvements patented is for the manufacture of hempen rope, and combines the stationary laying block with a condensing tube, whose diameter can be changed at pleasure by the insertion of trumpet-mouthed tubes to adapt it to ropes of different sizes, and in combining therewith a conical drawing roller so arranged as to regulate the strain upon the rope in condensing.

The other machine patented is for the manufacture of wire rope. In this machine arms extend out from the main shaft, which support the spindles upon which the bobbins are placed. The bobbins incline a little inwards towards the shaft; the strands are led off from these bobbins directly through a pair of grooved friction rollers, held together by weights or springs, which hold the strands while the laying is effected by the revolution of the main shaft and the bobbins. These friction rollers act as condensers. All the gearing heretofore used to prevent or modify the twist of the wires is dispensed with as injurious to the rope and an obstruction to the operation of the machine. The rope after passing the friction rollers above mentioned, passes around a large grooved drawing wheel, and under grooved pressure rollers to the drum which receives it. The simplicity of this machine is much in its favor, and enables it to run at a speed vastly higher than those heretofore in use for similar purposes. It is said to produce an article of wire rope of the best quality, and with much more rapidity than has heretofore been attained.

Weaving.—Several patents have been granted within the year for improvements in looms, the characteristics of which, so far as possible, I will sketch. Machinery of this kind is so complicated that it is seldom possible to give a clear idea of improvements upon it without drawings. Letters patent have been granted for a very simple and perfect knitting loom for knitting comforts and other similar articles. In this loom as many different colors of yarn, upon different bobbins, can be used as may be desirable; and they may be so arranged as to produce shades or contrasts in the fabric at pleasure, and stitches are made at a single operation, and in the time of one stitch, entirely around the article to be knit. In this machine the needles are arranged in a circle and parallel to each other, and in a vertical position. The bobbins are placed above upon a revolving frame. The yarns are then brought down and prepared in some convenient way for the knitting to commence. The needles then rise, and as they descend again each hooks upon one of the yarns and draws it down into a loop. The bobbin frame then revolves sufficiently to bring each yarn to the needle next to the one which last seized it; the needles then rise, and the loops already formed hang upon the shanks of the needles without rising. When the needles again descend each hooks upon the yarn which has been brought forward to it, dragging it down and forming another loop. As the needles descend they pass through a ring surrounding them all, and by which the hooked points are bent up close to the shanks of the needle, allowing them to pass the loops first formed, and as the needles continue to descend the first formed loops fall off from the needles around the necks of the newly formed loops. Another similar movement of the machinery in like manner forms new loops and casts off the last ones in the same manner, and thus the operation continues until the knitting is completed. This machine indicates much in genuity and possesses great merit. As the knitting proceeds, the fabric is drawn off by weights and pullies.

Letters patent have been granted for improvements in looms for weaving Brussels carpets. A faint idea of the character of this loom may be gathered from the following extract from the patent, and it would be impossible in this place to present a more detailed description which would be intelligible:

"The character of the first part of my invention consists in making the mechanism, which weaves the cloth or forms the body of the fabric separate, and having a distinct organization from the mechanism which operates the figuring wires, removes them from under the pile or figuring loops and introduces them under the open figuring warp, each of these having a distinct and separate organization, and being operated separately and connected by an intermediate mechanism, which starts one of them as it arrests the other by shifting what communicates the motive power from the one to the other.

"The character of the second part of my invention consists in taking the figuring wires from the apparatus which removes them from under the pile or woven figuring loops, by means of fingers or their equivalents, which receive and transfer them to the apparatus by which they are introduced under the figuring warps.

"And the third part of my invention consists in the method of introducing the wires under the figuring warps by means of a box into which they are dropped, which box (or its equivalent,) is carried under the figuring warps, drops the wire and is then moved back."

For the reason above given, I am obliged to pass entirely unnoticed several other looms which are well worthy of particular remark.

Letters patent have been granted for improvements in weavers' heddles. These heddles are formed in the following manner: A suitable number of threads are placed in a machine adapted to the purpose, and for some distance are formed into two braids. After a sufficient length of this braid is obtained, the threads are all braided together for a short distance; the threads are then separated and the braiding proceeds, producing two smaller braids, until sufficient is formed for the length of the loop through which the warp is to pass; the threads are then intermingled and all formed into one braid for a short distance, and they are then braided separately until a sufficient length is produced for the heddle. This heddle promises to answer an excellent purpose and appears to be free from the objections incident to most others.

Letters patent have also been granted for a machine for braiding these heddles, but it cannot be understood without drawings.

Wire Gauze.—Letters patent have been granted for an improved manufacture of wire gauze, which although it might be considered as belonging to manufactures in metal, may be appropriately noticed here. This gauze is generally made on looms, and when the wire is fine involves no difficulty. When the wire is larger and coarse, however, it is found that the warp wires alone bend, and the filling wires remain straight, rendering the fabric very imperfect. The improvement in question consists, principally, in crimping the filling wires by proper machinery, and cutting them into proper lengths before laying them between the warp. The improvement is great and obvious; and by it gauze can easily be woven sufficiently coarse for grating or railings.

Letters patent have also been granted for a loom for weaving this kind o gauze, in which the warp remains fixed and strained between the ends of the loom, and the lay travels along over it beating up the crimpled filling wires, as they are inserted.

Folding and measuring cloth.—Three patents have been granted for machinery of this kind within the year; but they are not easily described, and do not differ from those formerly known sufficiently to render any description, which could be here given, interesting or useful.

Having touched upon the improvements in each subdivision of this interesting class, I must now leave them, without further analysis, and proceed to the examination of the other classes under my charge. Press of business and numerous interruptions admonish me to be brief.

STEAM AND OTHER GAS ENGINES.

Twenty-five or thirty patents have been granted within the year for improvements in steam engines, comprehending modifications of many of the features of that important machine. So much ingenuity has been exercised upon the steam engine for such a length of time, that, as might be expected, few of the improvements, which have been examined, amount to any thing more than slight refinements upon what has heretofore been done, and therefore a review of them would not be particularly interesting; and, without descriptions more minute and full than would be appropriate in this place, very little light could be shed upon the subject. It should, however, be remarked, that results of the utmost importance may arise from very slight improvements in machines used so extensively and under such a variety of circumstances as the steam engine. The number of patents granted in this country and in Europe, for improvements in the steam engine, is almost incredible; but it should be recollected, that these improvements are not confined to the general character of the machine, but are connected also with its adaptation to the multifarious purposes to which it is applied, and the endless variety of circumstances in which it is placed—so that many modifications which would be absolute disadvantages, for some purposes, would not only be patentable, but of the highest importance in others. Some improvements have a general application, and are advantageous in any engine to which they may be applied; but, in general, it cannot properly be said that one variety of engines is superior to another—that the reciprocating engine, for example, is preferable to the rotary, or vice versa, without taking into consideration the circumstances under which it is to be applied. Each is best in its appropriate sphere, and neither is likely to supplant the other. Where fuel is plenty and cheap, the nice improvements which have been made for economising fuel might be out of place and result in disadvantage. Where water is pure, the ingenious devices which have been resorted to, for the prevention of incrustations, deposits, &c., would, of course, be an incumbrance. Under some circumstances, the most complicated engines are indispensable to success, and, under others, the simplest engine can be most advantageously employed. Thus, in addition to all other causes, circumstances, ever varying, furnish constant employment for inventive genius, and at every progressive step the field expands before it.

As I deem a severe analysis of the improvemens in steam engines unnecessary, sketches of a few only, will be submitted.

Letters patent have been granted for a reaction rotary engine, constituted and operating substantially as follows: The steam is generated in a circular tube or hollow ring. Between the point where the water is admitted and that where the steam is discharged, the tube is closed by a plug or otherwise. These two points are very near to each other; and the opening for the discharge of steam is nearly tangential to the hollow ring. At about half the distance around from the point where the water is received, to that where the steam is discharged, the tube is partially closed by a plug having small perforations for the passage of the steam, thus dividing the tube into two chambers. The water enters the first chamber through the shaft which is hollow and which has a branch tube extending from it like a spoke to the circular tube. The furnace is circular and by it the fire is applied constantly to all parts of the circular tube. The water is supplied to the first chamber of the tube, and as the heat is intense it flashes into steam and passing through the appertures in the partition plug is still further heated by the circular furnace and is finally discharged tangentially with great velocity, and by its reaction gives rapid motion to the circular ring and its shaft. Where great velocity, with little power, is required, this engine may be useful.

Two other rotary engines have been patented which have recesses in the periphery of the revolver, and counter recesses in the casing. When the steam is admitted it acts directly upon the revolver; it then acts expansively between the recess in the revolver and that in the casing, then rushes forward into the next recess, &c., and finally has a free exit from the engine after having gone nearly or entirely around. The specific difference between these engines cannot, in this place, be intelligibly set forth, and their general features must therefore suffice.

Letters patent have also been granted for so combining a steam-whistle with a float as to give an alarm when the water in the boiler becomes too low.

Letters patent have also been granted for improvements in several varieties of steam valves. A few years since, letters patent were granted for a drop-cut-off valve of considerable notoriety, which, when it fell, was received in a cup containing a liquid to prevent "slamming." Another device for the same purpose has been patented within the year, which substitues a moveable inclined plane for the liquid.

Letters patent have also been granted for connecting steam chests with side pipes by flexible joints in the following manner. Instead of bolting the steam-chest directly upon the pipe it is attached in any convenient manner by a steam tight joint to one edge of a flat ring of sheet-metal, and the pipe is attached in like manner to the other edge—thus forming a flexible connection between the two which will compensate for any expansions or contractions of the pipe resulting from the various changes of temperature to which it is subject.

It has been found desirable in some cases to place the boilers of locomotives and their engines on different cars—and in consequence the relative positions of the two are subject to a variety of changes from unevenness of the road and other causes. These changes would of course disturb the connections of the pipes with the boiler and engine. A system of jointed pipes has therefore been adopted and patented which compensates for all these relative changes of position, and obviates the inconveniences which would arise from the old mode of connection.

Passing over the other improvements in this class, I will call attention to a pneumatic engine patented within the year in this country and in England. This engine possesses but little novelty. The principal point of which is in regulating the pressure of the air upon the piston. This is effected by a stop-cock in the pipe leading from the reservoir to the engine. This stop-cock is operated by the pressure of that portion of the air which is admitted to the piston, and, consequently, when this pressure is greater than is required the stop-cock partially or entirely shuts off the air from the engine. It will be readily understood that whatever may be the pressure of the air, within the main reservoir, with this arrangement, the pressure on the piston will not exceed that to which the apparatus is adjusted.

It may appear singular that inventive genius is still directed towards improvements in engines of this kind when experiments the most numerous and of the most convincing character have incontestibly established the fact, that heat applied to the expansion of any gas affords but a small fraction of the power which would be derived from the same amount of heat applied to water or other liquids. It is, doubtless, true, that many ingenious men are giving their labors to the improvement of pneumatic engines under a misapprehension of principles, and in the vain hope of causing them successfully to compete with the steam engine. But such is not the case with all. There are, doubtless, circumstances under which the pneumatic engine, with all its advantages on general principles, may be eminently useful, in practice; and it is in this view of the case only, that improvements in these engines can be considered in any other light than that of ingenious trifling. As an instance in which these engines are useful, it may be remarked that they can be operated by a degree of heat vastly below that which is required to produce steam, and, consequently, in many factories where little power in the engine is required, they might be operated by what would otherwise become waste heat, without expense, when the use of a steam engine would be expensive, and, perhaps, might not be justified by the duty to be performed. This is one of the striking illustrations of the degree to which circumstances influence the usefulness of machinery which seems to operate in defiance of sound principles.

Without extending my remarks upon the subject of steam and gas engines, I will proceed at once to the consideration of my next class, which is

NAVIGATION AND MARINE IMPLEMENTS.

About twenty patents for improvements comprehended in this class have been granted within the year, some of which appear to be very desirable. The mass of these improvements however are not such as to claim particular attention in this place, although calculated to operate well and upon principles slightly different from such as have previously been known. Great utility cannot be expected in every patentable modification—but the vast importance of the few will easily reconcile us to the many. It is often observed also, that a novel modification from which little or no benefit seems derivable is frequently the first step towards the most important results.

Ship and Boat Building.—Several patents have been granted for improvements in the models and in the general construction of vessels. One of these is for constructing sail boats with two hulls or keels, united together at the bow and having but one stem—the hulls diverge and the space between them presents an inclined surface rising gradually from the lower end of the stem towards the stern of the vessel. It is said that this boat has greater stability than others, and with the wind abeam, will sail better; in a word that it possesses all the advantages of the twin boat without its disadvantages. With a side wind it will be perceived that the tendency to capsize is counteracted by the weight of the windward hull, which must be raised entirely out of the water, or the boat cannot go over—and when the wind is strong the windward hull is said to be raised sufficiently to present but little resistance, and that the boat will run with the resistance due only to the lee hull—and that the diverging position of this hull is such that the boat will run closer to the wind and faster than those of the ordinary construction.

Letters patent have also been granted for a lighter of peculiar model, and capable of accommodating auxiliary buoyancy. It is built with a view to unite the strength of a narrow boat with the stability and buoyancy of a wide one.

Letters patent have also been granted for building boats without the usual knees, by placing very thick planking together in the form of the boat required, and uniting them all to the kelson by long bent screw bolts passing through them, from the water ways down through the kelson.

Letters patent have been granted for improvements in building ships with wooden planking and ribbed plates of iron instead of knees. And also for a mode of ventilating the timbers of ships by the action of the bilge water. The ship must have a water tight lining inside of the timbers, openings are then made through the deck into the space between the planking and inner casing. The motion of the vessel will cause the bilge water to rush alternately from one side of the vessel to the other, expelling the impure gases and admitting fresh air. The openings in the deck can be governed in any convenient way. The numerous advantages of this contrivance are obvious.

Propellers.—Several patents have been granted for improvements in propellers; one for an improvement upon a propeller heretofore patented and noticed. Another for an improvement in casings for screw propellers, and another for improvements in the mode of feathering the floats of paddle wheels.

Letters patent have also been granted for improvements in propellers, having reference to the position, location, construction and motion of the paddle wheel, which are said to produce a degree of speed in vessels hitherto unknown, and at a moderate expenditure of power. The shafts of the propellers are parallel to the length of the vessel, and the floats make a small angle with the shaft. The shaft is so placed that the floats *only* will enter the water. The propellers are placed at the side of the vessel where there is the greatest breadth of beam, and revolve inwards, pressing the water against the hull. The floats are so connected with the arms of the propellers as to present a smooth surface throughout their length. The motion of the wheel is intended to be very rapid, and as the float strikes the water between it and the hull, it is said that the water moves but little, but the wheel rushes forward upon it, much as it would upon a solid inclined plane, carrying the boat forward with great speed. This advantage, if it exist, is due to the very rapid motion of the wheel, and to the vis inertia of the water. But this mode of propelling has other advantages of a less equivocal character. The ordinary paddle wheel, revolving with sufficient rapidity to propel the boat at high speed, say eighteen miles per hour, moves through the air in a direction opposite to that of the vessel, at a speed equal to its own added to that of the vessel, which will amount, perhaps, to forty miles per hour. Moving at this rate, the resistance which the wheel makes directly to the progress of the boat, and the resistance of the air to the motion of the wheel, which reacts upon the motive power, are immense, and subtract from the progress of the boat and from the power of the engine a very large per centage. These resistances are avoided by the mode of propelling now under consideration; and not only so, but the propeller seizes upon the air as well as the water, and without touching the water would propel the vessel at a very considerable speed. The advantage thus gained is very great, but experiment must determine the precise amount of it. If the ordinary wheel is covered by a "wheel house," still the resistance of the air to the motion of the wheel is very great, and the resistance of the wheel-house passing through the air at high speed, must also be taken into consideration. It is an unquestionable fact in mechanical philosophy, that power acting directly, as it does in the ordinary paddle wheel, will produce its greatest effect; but when we take into consideration the immense resistance with which it must contend when acting in this manner, the question immediately arises whether it would not be advantageous to exchange a portion of the benefits arising from direct action, for those which result from avoiding the resistances incident thereto. It is believed that the above mode of propelling is worthy of careful consideration and experiment.

Several patents have been granted for steering apparatus, windlasses, ships' blocks, fenders for canal boats, &c., which, although useful, do not present those radical novelties which would render a notice of them, in this place, particularly interesting or useful.

CIVIL ENGINEERING AND ARCHITECTURE.

Upwards of twenty patents for improvements in civil engineering and architecture have been granted within the year, some of which will receive particular notice under their appropriate heads.

Excavators.—Two patents have been granted for excavators; the one for levelling, that is, excavating earth where it is too high, and depositing in low places. This excavator is attached to a cart, and may be adjusted or removed at pleasure.

The other is for a ditching machine, for forming ditches and embankments, which will answer the purpose of fences. This machine, as it advances, cuts two ditches, the cross section of which is a triangle—with proper space between them for an embankment, and deposits the earth and turf excavated from the ditches upon the ground left between them, forming an embankment in such a manner that the turf shall be on the outside and shall completely cover the embankment, from the top to the edge of the ditch.

Rail Roads.—Several patents have been granted for improvements in rail roads and machines for keeping them in order, some of which deserve notice. One patent has been granted for improvements in the rail, and the manner of fastening it to the stringers, which allows the rail after it is worn to be turned upside down and end for end—thus successively presenting four edges for the action of the flanches of the wheels and giving durability to the rail.

An improvement has also been patented in switches and fixtures upon cars for operating them, the object of which is to avoid the evils arising from an improper position of the switch. The switch and the fixtures upon the car are so arranged that when the switch is out of place it can be properly replaced before it is reached by the car wheels. Considering the fatal accidents which sometimes arise from a displacement of the switch, improvements of this kind must be regarded as very important.

Letters patent have also been granted for improvements in fixtures to locomotives for clearing the track of ice, snow, &c. The apparatus is complete and is calculated to remove all kinds of obstructions from the road whether they be one or many.

Letters patent have been granted for a new apparatus for ascending and descending inclined planes by locomotives and their trains. In addition to the ordinary fixtures of the locomotive, wheels griping a central rail are attached and propelled when the locomotive is on the inclined plane—and by these principally it is drawn up, or its progress down is properly checked. These wheels are governed in their relative positions by strong springs so that the lateral motions of the locomotive shall not disturb the central rail, and they are so connected with the train of cars by toggle joints, that the greater the weight of the train the greater will be the pressure and adhesion of the wheels upon the rail, either in ascending or descending. This device by which the cars regulate the adhesion according to their own necessities is very usefully and ingeniously applied.

Drilling Rocks.—Letters patent have been granted for a drilling machine of very simple construction and which at the same time appears to be very effective. The drill is attached to the end of a cord of sufficient length, which passes over a pulley which may be elevated or depressed to adapt the machine to different depths—the other end of said cord being attached to a wheel moved by a crank, which is operated by any convenient power. As this wheel revolves the cord is wound upon it, and the drill raised; but at a certain point of the periphery of this wheel there is a projection which pushes the cord off and allows the drill to fall and do its work. This winding of the cord upon the wheel and pushing it off, gives it a twist, the effect of which is communicated to the drill, which is consequently turned more or less at every stroke, thus dispensing with the complicated and inconvenient devices often resorted to for turning the drill.

One patent has been granted for improvements in dry docks. The invention presents but little novelty and perhaps less utility and need not be described.

Letters patent have been granted for an apparatus in combination with structures at the shore, for deepening the channels of rivers. The apparatus in question is for ascertaining the precise direction of current, after the manner of a weather-cock, in order to enable the engineer to determine in what direction to build the structures for directing the channel.

Three patents have been granted for improvements in fences. One of these fences is intended for the vicinity of rivers which are liable to overflow their banks, and is so constructed that in case of a flood it will fall down and partially float in the water, and be in condition to be easily restored to its position after the flood has subsided, instead of being swept away as is usual in such cases.

The others are built upon the "lever and fulcrum" principle, as the patentees term it. The rails of these fences cross each other at their ends and pass through mortices in posts or small wedge-shaped posts are placed between the ends of each set of rails and the long part of the other, so that the joint cannot yield in one direction without breaking. These fences except occasionally a post of them, are intended to rest on the top of the ground, and the points where the rails meet are held, on the side upon which they could yield, by short posts driven into the ground or in some similar and convenient way. Whether these fences will answer a better purpose than those heretofore in use must be determined by experiment.

Rail Road Alarms.—One patent has been granted for a rail road alarm, but it is a re-issue of a patent granted some years since, and too well known to require description.

Letters patent have been granted for improvements in metallic roofing. The novelty of the invention is not very striking, but consists principally in so shaping the plates as at once to make a sound roof, and have each plate in such condition that it can be removed and another substituted without disturbing the other plates of the roof.

Pneumatic Rail Way.—One patent has been granted for improvements in this variety of rail way. Flexible air-tight tubes are placed along the track for the wheels of the cars to travel upon. Air is then forced into these tubes, behind the wheels, by any known means, and as the tubes expand in rear of the wheels they are caused thereby to revolve and the car progresses. The tube, the wheels, and the ways, are so adapted to each other, that the air forced into the tube will not pass the wheel.

A very important improvement in pile drivers has been patented within the year. The machine is operated by steam. The driver is connected with the piston rod of a steam engine, which rests upon the top of the pile and is properly guided in its descent. The steam pipe connecting the boiler with the cylinder is jointed so that the apparatus may ascend and descend without disturbing the connection. When the steam is let into the cylinder the piston and driver are raised and by the discharge of the steam are allowed to fall upon the top of the pile driving it downwards. These blows may be given very rapidly, and their force is much aided by the weight of the apparatus resting upon the top of the pile and descending with it.

Bridges.—Three patents have been granted this year for improvements in bridges. One is for an improved mode of passing the wires or ropes for sustaining suspension bridges across the water. Another is for a system of trussing along the middle of the bridge to sustain it against vertical or lateral pressures. The third is for a combination and some other modifications of the systems of suspension and thurst, heretofore resorted to, for sustaining bridges. The bridge seems to combine lightness, cheapness, and great practical utility, but it would be impossible in this place to give a clear description of it.

No other inventions in this class appear to require particular notice, and I will therefore pass on to the next.

LAND CONVEYANCE

Upwards of thirty patents for improvements belonging to this class have been granted within the year, some of which are of considerable importance.

Wheels for Cars and Carriages.—An unusual number of improvements in wheels have come under my observation this year. Most of which are intended to obviate the difficulties which have always existed in connecting the rims of cast iron wheels with the hubs. The tread and flanches of car wheels should be chilled; and they are necessarily much thicker than the discs which connect them with the hub. These circumstances render it very difficult to accommodate the shrinkage of the various parts, in cooling, to each other, and if this is not done the wheel will crack or be weakened in such a manner as to become useless—or if applied to use disastrous accidents will frequently follow. To avoid this evil the discs have been made concave, convex, and concavo-convex, and fluted in various ways. These shapes, it is easily perceived, are capable of yielding as they cool in such manner as to compensate in some degree for shrinkage, but still it has been found difficult to cast perfect wheels. Wheels having one disc, and those having two, have already been cast, but letters patent have been granted this year for a wheel with two outward and one central disc. Three discs being made and arranged as above, the plates may be made much thinner, giving the required strength, and cooling quicker, so as to avoid the consequences of shrinkage, after the rim is chilled.

In another of the wheels patented the two ends of the hub are connected together by a convex plate which will allow the ends of the hub to approach or recede from each other in cooling and thus compensate for the inequality of shrinkage.

In another of the wheels patented the whole wheel, discs and all, are chilled with a view of avoiding unequal shrinkage altogether.

Several other patents have been granted for improvements in wheels but it is deemed unnecessary to dwell longer upon this subject.

Brakes.—Two patents have been granted for valuable improvements in carriage brakes which it would be difficult to describe intelligibly, and which will therefore be passed over.

Boxes for Axles.—Letters patent have been granted for an improvement in boxes for axles which allows slight vibrations of the axle in every direction, and increases the durability of the parts, at the same time rendering the motion of the cars easier.

Another improvement in boxes has been patented which consists of a kind of skeleton frame work to hold the anti-attrition metal now so generally used in boxes. The advantage of these is that wherever the soft metal is too much worn the whole can be taken out without difficulty and another frame with its soft metal immediately substituted.

Carriages.—Several patents have been granted for improvements in carriages, one of which is for rendering them capable of floating over streams, marshes, &c. where they are too deep for the wheels. The parts are so arranged that wherever the water is sufficiently shallow, the burden will be borne by the wheels, and when too deep for this the whole will float.

Several patents have been granted for hanging carriage bodies. One for hanging them, so that any weight at any point upon them will depress them equally at all points. Another for hanging them upon springs and levers, so that the springs shall lie along the bottom of the carriage body; and also for supporting the ends of the spring on the axle near the hub and making it act as the bolster with the fifth wheel above it.

Letters patent have also been granted for a convenient mode of changing the pole or thills of carriages so as to adopt them to one or two horses at pleasure.

Letters patent have been granted for an improvement in pneumatic springs for carriages which cannot in this place, be fully described, but which consists principally in connecting the moving and stationary parts together by flexible media impervious to air.

Several patents have been granted for improvements in whiffle-trees and harness, intended to facilitate the disengaging of the horse from the carriage in cases of necessity. It is not deemed important to give a particular description of them.

Letters patent have also been granted for an improvement in washers and lynch pins intended to retain the lynch pin in place.

Letters patent have been granted for improvements in the bodies of coal cars. The car body has the form of an inverted frustum of a cone which allows the bottom of it to extend nearly to the ground between the wheels; and nearly mid-way between the top and bottom of the car body, bars are placed across to relieve the bottom from the principal part of the weight of the load.

It is not thought necessary particularly to notice the remaining improvements in land conveyance.

HYDRAULICS AND PNEUMATICS.

Upwards of twenty patents have been granted within the year, for improvements belonging to the class of hydraulics and pneumatics, very few of which can be particularly noticed. These subjects have so long exercised the ingenuity of inventors that little else appears possible, but to refine upon what has already been done. These refinements, however, important, generally differ so little from what has previously been done, that it would be impossible without drawings and descriptions more minute than can be here given to point out their patentable characteristics.

Raising Water.—Several patents have been granted for improvements in pumps and other devices for raising water, some of which may be noticed. Two of these are for the combination and arrangement of the valves and valve seats with the water-ways in such a manner, that by simply removing a small plate, the valve and seats are entirely liberated, and may be removed and replaced without difficulty.

The syphon has long been known for elevating liquids from one vessel and discharging them into another; but however high the liquid may rise in its passage from one point to the other, its has always been discharged at a point lower than that at which it was received, except in the case of the syphon ram. Letters pátent have been granted within the year for improvements in the syphon, by which a portion of the water is discharged at a point higher than that at which it is received. The machine is complicated, and cannot here be intelligibly described.

Letters patent have been granted for a portable steam pump, intended principally for pumping the water from sunken vessels. It is very compact and effective. It consists of a steam cylinder, piston, piston rod and cross head, placed between two pumps, the cross head being connected with the piston rods of the pump, and operating them. The pumps and engine are in a horizontal position, and the platform upon which they rest is hollow, and contains the valves and water-ways. This pump is too well known to render further description of it necessary.

Letters patent have also been granted for a centrifugal pump for wrecking purposes, with which it is said successful experiments have been already made.

Two patents have been granted for improvements in the water ram, the object of which is to elevate pure water by the use of that which is impure, economizing the pure water and wasting only the impure. The two kinds of water are kept separate during the operation of the machine—in the one case by a flexible vibrating diaphragm, and in the other by a stratum of air and vertical partitions. Both machines seem calculated to answer a useful purpose

Letters patent have been granted for a hydraulic engine. It has two cylinders and pistons, and the water, in driving the engines, operates alternately on one side of each piston. This engine possesses but little novelty, and much resembles a primitive steam engine.

Letters patent have been granted for improvements in filtering stopcocks, and also for improvements in fire engines. The improvement in the fire engine has reference to stability, and a more convenient and effective application of the power.

Several patents have been granted for improvements in water wheels, most of which are slight modifications of those already in use, and some of them are complicated. No descriptions of them, therefore, which would be interesting or useful, could be given in this place, without transcending appropriate limits; and as the same remarks apply to other improvements in this class, I will here dismiss it and hasten to the next.

MILLS, MECHANICAL MOVEMENTS, &c.

Nearly twenty patents for improvements in machinery belonging to this class have been granted within the year. Many of these "improvements" would perhaps more appropriately be denomiated *changes*, as they appear to promise but little utility. Some of them, however, are worthy of notice.

Grinding Mills.—One of the patents granted this year for improvements in grinding mills was noticed in my last report, having been examined in December, 1846, and although apparently an important improvement, does not require further notice.

Letters patent have been granted for a mode of elevating and depressing the runner stones of several mills at a time, so that all shall have the same adjustment by a single operation.

Letters patent have also been granted for making the drum which drives the mill spindle, at the same time a fan for cooling the stones and for blowing out any dust which may be in the grain as it drops from the hopper into the mill.

Horse Powers.—Three patents have been granted for modifications of horse powers, a correct idea of the characteristics of which cannot here be given. One of them appears to be useful, as it is simple of its kind. and efficient. The other two manifest much more ingenuity than utility. Fewer attempts at improvements in horse powers seem to have been made during the past year than formerly.

Letters patent have been granted for improved machinery for elevating grain from vessels. The vessel, in consequence of the motion of the water, is seldom at rest, and the grain to be elevated is for other reasons at various depths. The object of the machinery in question is, by a self-acting apparatus, to compensate for the inequalities above mentioned, without interrupting the operation.

An ingenious machine for dressing mill stones has been patented this year, which, however, is too complicated to be intelligibly described in this place. The cutters are so regulated as to vary the depth and width of the different parts of the grooves in the manner required.

Letters patent have also been granted for an improvement in drivers for mill stones, so constructed and connected with the spindle and mill stone that the stone may retain its proper position, independent of the vibrating or wabbling motion of the spindle. A very perfect mode of suspending shafts, whether for mills, water wheels, or other similar purposes, has also been patented.

Letters patent have been granted for improvements in producing a reciprocating, by a rotary motion; and two patents have been granted for changing gearing for the purpose of increasing or diminishing the speed of machinery, without interfering with the motive power.

Letters patent have also been granted for improvements in jointed pitmans or connecting rods, which enables them to work evenly and with certainty, and at the same time adapt a long piston stroke to a short crank, or vice versa.

Letters patent have been granted for an improved mode of coupling line shafts. In most factories it is desirable that the shafts should be so coupled as to allow some vibration; but shafts for driving spinning, and some other kinds of machinery, should revolve if possible without the slightest vibration. To effect this object, and for great strength, the shafts at the ends where they meet have discs of considerable diameter upon them, which, except near the centre, lie against each other, forming a perfect joint. In the edges of these discs, parallel with the shaft and opposite each other, grooves are cut. A cup, having ribs on the interior of its cylindrical sides fitting the above mentioned grooves, is slipped on over them both, there being an opening in the bottom of the cup or collar to receive the shaft. Screws are then passed through the bottom of the cup and through both discs fastened to the shaft, binding the cup and discs firmly together. This joint is very strong and inflexible. The torsive strain comes entirely on the ribs and grooves above mentioned, and the screws sustain only the longitudinal strain.

Letters patent have also been granted for an improved regulator for machinery. The patentee's principle may be variously and extensively applied. A small pump for air or water is connected with the machinery to be regulated and driven by it. This pump discharges itself into a small reservoir, having a float in it, which rises and falls with the fluid. In the lower part of the reservoir there is an adjustable stop cock, to discharge the fluid pumped into the reservoir by the action of the machinery. The float may be connected with the throttle valve of the steam engine, or may be connected with a brake or some similar device, for checking the motion of the machinery. The stop cock is then adjusted to the speed required, and while the machinery moves at the speed required, the water will remain at the same height, and the float will be stationary. If the machinery should move too fast, the fluid will be pumped into the reservoir faster than it can be discharged, and of course will rise carrying the float with it, and thus operating the throttle valve, and partially shutting off the steam, or bringing the brake upon the machinery and checking its motion. If the machinery moves too slowly, the water in the reservoir will descend, opening the throttle valve, and allowing a larger supply of steam, or removing the brake from the machinery. This regulator promises great usefulness, and is free from the prominent defects incident to most regulators now in use.

Nothing further in connection with mills and mechanical movements has transpired at my desk which need be made the subject of remark.

LUMBER AND MACHINERY FOR WORKING THEREIN.

About thirty patents have been granted this year for improvements belonging to this class. It comprehends a great variety of machinery to which important additions are annually made Machines for working in lumber have already attained so high a degree of perfection, that almost every variety of form may with the greatest facility be produced and finished by them. Yet the march of improvement is onward towards a still higher degree of perfection.

Saw Mills.—Several patents for improvements in saw mills have been granted this year, one of which is for a steam cross cut saw. In this machine the saw is connected directly and firmly to the piston rod of the engine, and the cylinder vibrates slightly on trunions for the purpose of depressing and elevating the saw as it moves back and forth for sawing; guides to preven vibrations of the saw are placed near the points where the saw operates upon the timber. A minute description of this machine cannot be given in this place.

Another patent has been granted for a machine for sawing wood. It has the usual motions of machines for this purpose which it receives from a weight; and when the log is sawed off, the saw is raised, and the motion stopped by a self-acting apparatus, and the whole prepared for another cut.

Letters patent have also been granted for sawing arabesque work for chair backs, &c.; for guaging, scribing, and sawing rails, for winding stair-cases, and other similar purposes.

Letters patent have also been granted for improvements in regulating the feed of saw mills. The feeding is usually effected by a hand taking into a ratchet, or rag wheel, and operated directly or indirectly by the saw gate; and when a change in the feed is required some modification of its connection is usually made. But in the patented machine under consideration the hand is supported, near the point where it works into the ratchet wheel, by friction rollers resting and travelling on inclined planes—and by elevating or depressing these planes, the hand will be allowed to take into the ratchet at the moment it commences its motion forwards, or may be made to pass over one or more of the teeth before the feed commences.

Letters patent have been granted for a saw mill possessing great perfection of parts and combinations and great versatility of action. It is adapted to ordinary rectilinear sawing, to the sawing of curves regular or irregular, and to the sawing of warped surfaces, such as are used in ship building and elsewhere. It will be readily perceived that machinery which is principally self-acting and capable of such a variety of duties, cannot be intelligibly described in this paper.

Letters patent have been granted for slitting boards by a machine having a series of circular knives, of different shaped edges, placed in nearly parallel rows opposite each other, their diameters such that as the board is driven between them each pair cut deeper than the last, until the strips are entirely separated.

Letters patent have been granted for an improvement in machines for sawing shingles by circular saws. When the circular saw is used for this purpose the distance which the block must travel against the saw for an entir separation of the shingle, depends not only upon the length of the block but upon its thickness, and therefore provision must always be made for the block carriage to travel, before returning, a distance sufficient for separating the shingle from the thickest block, which would be greater than is necessary for thinner blocks, and considerable time would be lost after the sawing of each shingle from all blocks but those of the maximum thickness. The machine in question is so constructed as to be operated upon by the thickness of the block in such a manner that the thickness shall regulate the distance that the carriage shall move, and stop it and allow it to be carried back preparatory to another cut, as soon as the shingle is fully separated, whatever may be the thickness of the block.

Letters patent have also been granted for improvements in machinery for making splints for baskets. It is so constructed that the travel of the splint knife can easily be adjusted to the length of the splint, and a lateral motion is allowed to it by suspending it upon taught cords, which will allow it to follow the grain of the plank from which the splints are to be taken instead of cutting.

Letters patent have been granted for several improvements in stave and barrel machinery, some of which are too complicated, and others are not sufficiently important to justify an elaborate description.

Letters patent have been granted for turning trenails in such manner as not to interfere with the grain of the wood. The bolt from which the trenail is formed is not always straight, and if so turned as to make the trenail straight, it would thereby be weakened and would not hold so well as one that is slightly crooked—hence the importance of a machine capable of adapting itself to the grain of the bolt to be turned.

Letters patent have been granted for a machine for turning out wooden bowls from blocks. The improvements consist chiefly in the susceptibility of the machine to be adjusted and adapted to the manufacture of bowls of different sizes and thicknesses.

Letters patent have also been granted for improvements in turning irregular shapes. The principal difference between this and some other machines heretofore in use, consists in the motion of the saws or cutters, which in this machine act with the grain of the wood and upon an axis nearly at right angles to the length of the block to be operated upon, instead of operating across the grain as is usual.

Letters patent have also been granted for machinery for making window sash. Although the improvements are important, yet it would lead me too far to set forth intelligibly the merits of the invention.

Planing Machines.—Several patents have been granted for improvements in planing machinery within the year, some of the peculiarities of which should be noticed. One of these machines has a cylinder with radial cutters placed lengthwise of the cylinder. This cutter revolves as the plank advances and scores its surface. After passing the scorer, the plank is forced against a stationary roughing cutter and also against a smoothing plane placed behind it, which finishes the work.

Another patent has been granted for improvements in machinery for planing slats for blinds, &c. The machine in question manifests ingenuity, but has too many parts, and is too complicated for a description in this place, and probably for practical utility.

Another planing machine has been patented, whose operative parts consist principally of a rougher to prepare the plank and reduce it to the proper thickness, and stationary planing cutters under which the plank passes as it leaves the rougher for smoothing. Then feed and pressure rollers are so arranged that the last roller on the side opposite to the cutter shall be a little nearer the cutter than the corresponding one on the opposite side, in order that the plank may be slightly sprung down upon the cutter. It is said that this machine does its work in a satisfactory manner and with great rapidity.

Letters patent have been granted for improvements in connecting feed rollers with each other and with the machine for planing. By the modes of gearing and operating feed and pressure rollers heretofore known, it has been impossible to give them that degree of adjustment which will adapt them to the great variety of thickness of the stuff without throwing them out of gear. This difficulty is obviated by the invention under consideration as follows: Each roller has a pinion at its end, which works into another pinion revolving on a pin, and connected to it by a link equal to the sum of the radii of the two. These two auxiliary pinions are again united to each other by a similar link, which causes them constantly to take into each other.

These form a constant connection of the feed rollers with each other through the medium of the two auxiliary pinions; so that when one is caused to revolve, the other will revolve with it. The pins upon which the auxiliary pinions revolve are not connected with the frame, but are simply connected by the links above mentioned to each other and to their respective feed rollers, which allows them to change their position freely, following the feed rollers. The boxes in which the gudgeons of the upper feed roller revolve, work in vertical slots, which allow them to rise and fall at pleasure, and are kept to their place by weights, &c. With this construction it will be perceived that the feed rollers may lie against each other, or may be separated until the three links are in a straight line without interrupting their feed motion or throwing the parts out of gear. This will give all the compass that can be desired, and entirely obviate the difficulty heretofore experienced.

I must here close my remarks upon improvements in planing machines and upon the class of machinery for working in lumber.

FIRE ARMS AND IMPLEMENTS OF WAR

This class is less comprehensive and diversified than the others, and of course presents fewer subjects for inventions. It has this year received considerable attention; and although the number of patents is much less than in the other classes, yet they are more numerous than usual, and on the whole, the improvements possess more than an average importance.

Letters patent have been granted for improvements in casting bullets. The moulds are connected together in sections, forming an endless chain or belt. This belt passes under the reservoir of molten lead, and the moulds are filled, and the belt passes along in a horizontal position until the balls become cool. The belt is then bent around a pulley which at once drives it and opens the sections of the moulds from which the balls fall. The belt afterwards passes around one or more additional pullies and up again to the reservoir. Thus while one portion of the moulds is receiving the molten lead, the bullets are cooling in another, and are discharged at a third without any interruption.

Letters patent have been granted for improvements for that variety of fire arms that receive the load at the breach; also, for an improvement in many barrelled pistols, by which all are discharged at once, with very little chance of failure. Letters patent have also been granted for improvements in that class of wrought iron guns, which are constructed of staves and hoops.

Letters patent have been granted for an important improvement in fuses, to be used in blasting rocks, &c. The fuses heretofore used are somewhat uncertain in their action. They occasionally, from various causes, become extinct, causing great inconvenience, and not unfrequently, consequences of a much more distressing character, arise from the apparent extinction of the fuse. The workmen encouraged to return to their work by an apparent extinction, and the charge exploding produces immense destruction of life. To make the fuse certain and prevent these disasters, it is made and covered in the usual way, but has placed in its centre, through its whole length, a core thread saturated with saltpetre or a similar substance, which will burn with the fuse, and will not be extinguished by the causes which usually extinguish the fuse. If, then, the fuse becomes extinct, the core thread continues to burn until it again ignites the fuse, as often as it becomes extinct, until the fire reaches and explodes the charge. The importance of this invention is readily appreciated.

An improvement in casting ordnance, apparently of great value, and the last I shall notice in this class, has been patented within the year, which is also applicable to the founding of all large hollow cylinders. The cannon, or cylinder is cast upon a core, in a mould of proper size and form. Tubes are passed down nearly to the bottom of the cove. These pipes are for the circulation of currents of air, or water for cooling. The flask or casing of the mould is surrounded by a furnace, communicating heat to the exterior; and the cannon, after being cast, is allowed to cool, principally under the influence of the currents of air or water within, and the moderate heat of the furnace without.

When the cannon is cast solid and allowed to cool in the ordinary way, the outside first becomes cool, and shrinks to the size necessary to surround the hot mass within. As the mass cools and contracts, the outer part which has already suffered nearly all the contraction it is capable of, cannot accommodate itself to the contraction of the mass within and a strain among the particles immediately commences, and increases until the cannon is entirely cool. That portion of the iron which when hot filled the space within the comparatively cool exterior ring is not sufficient, when cool to fill it without being strained out of its natural state, and this unavoidable strain is very injurious to the iron and impairs the strength of the cannon. If the cannon were permitted to cool within and without, the iron between these two surfaces would suffer in a similar manner, and the like injury would be sustained. These inconveniences, the invention above described was intended, and seems calculated to obviate. The cooling commences within, and by degrees extends throughout the mass, the outer surface cooling last. The inner shell being first formed, all without being still hot, each stratum as it cools can adapt itself to that which is already cooled within. The inner part being cooled suddenly is rendered hard and capable of resisting the action of the charge without injury to its surface, and the outer parts in consequence of cooling so slowly become comparatively soft and tough, and capable of resisting the strains and shocks which it is destined to sustain. Unless there are practical difficulties in this mode of casting which are far from being obvious, the improvement is of immense importance in casting ordnance and all heavy hollow cylinders.

MISCELLANEOUS.

Nearly 20 patents belonging to this class, or which are not comprehended in the others, have been granted this year. They are not generally however of great importance, and I shall notice but few of them. Some of these patents are for fire escapes, twine stands for counters, cigar machines, skates, cutting and raising ice, making brushes, and making baskets, &c. Letters patent have been granted for machinery for rasping dyewood. It consists of a series of circular saws upon a shaft, with rings or discs between them to keep them at the proper distance from each other. These saws are parallel to each other, and make nearly but not exactly a right angle with the shaft. The teeth of these saws, when the shaft is revolved, will come successively in contact with every point of the surface to be rasped, and being saws instead of the spiral strips heretofore used in a similar manner possess sufficient strength for the service required.

Two patents have been granted for improvements upon those fish hooks, which have an auxiliary striking hook, and which were patented in 1835. One of these patents is for an improved mode of liberating the striking hook for action, and the other is for making the bait hook changeable, so that if broken or if a hook be not of proper size another can be easily substituted. Other patents in this class have been granted, but a notice of them is not important and would not be interesting.

I have thus presented a view of the progress of the useful arts, so far as their development has come under my observation, in discharging the duties of my desk. The result would be highly honorable to the industrious and inventive spirit of any people if it were confined, in the classes I have reviewed, to the improvements noticed in this report. But the half has not been told. The genius, energy, and patient perseverance of the inventor in the noble work of improvement, in those arts which minister to the necessities, the conveniences, and the enjoyments of man, have far outstripped the tardy foot of legislation, and have transcended the limits of legislative provisions for their protection. Nearly half the applications referred to my desk during the year remain unnoticed in consequence of a notorious inadequacy of force to make the requisite examinations. In forming an estimate therefore of the vast number and importance of the inventions developed within the year, large additions should be made for those which are still unexamined; and consequently cannot at present be described; among which a glance suffices to show there are some whose interesting and important characteristics will not suffer in comparison with the noblest inventions of former years.

Respectfully submitted by

W. P. N. FITZGERALD,

Examiner of Patents.

Dec. 31st, 1847

F.—*Tabular Estimate of the Crops for 1847.*

No.	State or Territory.	Population in 1840.	Present estimated population.	No. of bushels of wheat.	No. of bushels of barley.	No. of bushels of oats.	No. of bushels of rye.	No. of bushels of buckwheat.	No. of bushels of Indian corn
1	Maine	501,973	600,000	890,000	286,650	1,720,000	195,000	76,000	2,890,000
2	New Hampshire	284,574	300,000	610,000	129,150	2,100,000	460,000	169,000	2,280,000
3	Massachusetts	737,699	850,000	256,000	170,100	2,000,000	620,000	138,000	3,410,000
4	Rhode Island	108,830	130,000	4,500	54,000	210,000	50,000	4,500	800,000
5	Connecticut	309,978	330,000	125,000	28,000	1,810,000	1,200,000	480,000	3,180,000
6	Vermont	291,948	302,000	664,000	55,000	3,905,000	350,000	330,000	2,100,000
7	New York	2,428,921	2,780,000	14,500,000	3,931,000	26,200,000	3,650,000	3,660,000	16,000,000
8	New Jersey	373,306	416,000	1,100,000	10,000	5,228,000	3,050,000	980,000	8,000,000
9	Pennsylvania	1,724,033	2,125,000	14,150,000	150,000	18,835,000	12,000,000	3,600,000	20,200,000
10	Delaware	78,085	80,000	410,000	4,400	650,000	55,000	14,000	3,620,000
11	Maryland	470,019	495,000	4,960,000	2,900	1,860,000	975,000	115,000	8,300,000
12	Virginia	1,239,797	1,270,000	12,000,000	90,000	10,000,000	1,500,000	260,000	36,500,000
13	North Carolina	753,419	765,000	2,350,000	4,000	3,507,000	235,000	18,000	25,000,000
14	South Carolina	594,398	605,000	1,300,000	4,500	1,000,000	54,000	......	12,600,000
15	Georgia	691,392	800,000	1,950,000	12,300	1,140,000	70,000	......	25,000,000
16	Alabama	590,756	690,000	1,200,000	7,500	1,831,000	75,000	......	26,000,000
17	Mississippi	375,651	640,000	500,000	2,000	1,378,000	23,000	......	16,000,000
18	Louisiana	352,411	470,000	......	......	......	2,200	......	9,000,000
19	Tennessee	829,210	950,000	8,750,000	6,500	9,918,000	390,000	98,000	74,000,000
20	Kentucky	779,828	855,000	6,000,000	18,000	14,100,000	2,650,000	16,000	62,000,000
21	Ohio	1,519,467	1,850,000	16,800,000	240,000	26,500,000	1,000,000	1,200,000	66,000,000
22	Indiana	685,866	960,000	7,500,000	39,000	15,290,000	250,000	100,000	38,000,000
23	Illinois	476,183	735,000	4,900,000	116,000	4,200,000	155,000	120,000	33,000,000
24	Missouri	383,102	600,000	1,750,000	13,000	6,020,000	86,000	25,000	25,000,000
25	Arkansas	97,574	152,400	200,000	1,000	440,000	10,000	......	7,000,000
26	Michigan	212,267	370,000	8,000,000	210,000	5,500,000	90,000	290,000	6,500,000
27	Florida	54,477	75,000	......	......	10,000	......	......	1,000,000
28	Wisconsin Territory	30,945	215,000	1,200,000	30,000	1,500,000	8,000	30,000	1,000,000
29	Iowa	43,112	130,000	1,000,000	35,000	1,000,000	12,000	20,000	2,900,000
30	Texas	......	140,000	1,110,000	......	......	......	......	1,500,000
31	District of Columbia	43,712	46,000	16,000	......	15,000	7,500	......	45,000
32	Oregon	......	20,000	50,000	......	......	......	......	525,000
		17,069,453	20,746,400	114,245,500	5,649,950	167,867,000	29,222,700	11,673,500	539,350,000

E.—Continued.

No.	State or Territory.	No. of bushels of potatoes.	No. of tons of hay.	No. of tons of hemp.	No. of pounds of tobacco.	No. of pounds of cotton.	No. of pounds of rice.	No. of pounds of silk cocoons.	No. of pounds of sugar.
1	Maine	7,800,000	1,113,000	......	......	....	......	550	500,000
2	New Hampshire	4,655,000	606,000	......	......	....	......	880	2,225,000
3	Massachusetts	4,308,000	682,000	......	135,000	....	......	40,000	530,000
4	Rhode Island	730,000	71,000	......	......	....	......	960	......
5	Connecticut	2,832,000	550,000	......	806,000	....	......	200,000	45,000
6	Vermont	7,086,000	1,250,000	......	......	....	......	8,000	10,500,000
7	New York	24,000,000	3,800,000	......	30,000	....	......	5,000	12,800,000
8	New Jersey	1,850,000	434,000	......	......	....	......	4,500	......
9	Pennsylvania	7,600,000	1,720,000	......	600,000	....	......	35,000	2,000,000
10	Delaware	160,000	20,000	......	......	....	......	3,600	......
11	Maryland	900,000	125,000	......	25,000,000	....	......	7,900	......
12	Virginia	2,950,000	400,000	......	50,000,000	2,500,000	3,000	6,350	1,750,000
13	North Carolina	2,600,000	136,000	......	14,000,000	42,000,000	3,500,000	6,200	15,000
14	South Carolina	3,500,000	30,000	......	35,000	100,000,000	75,000,000	5,800	35,000
15	Georgia	1,840,000	24,000	......	205,000	210,000,000	15,500,000	6,000	370,000
16	Alabama	2,150,000	18,000	......	350,000	160,000,000	300,000	5,880	15,000
17	Mississippi	2,050,000	800	......	200,000	250,000,000	1,000,000	250	......
18	Louisiana	1,300,000	27,000	......	135,000	195,000,000	4,000,000	1,200	275,000,000
19	Tennessee	2,700,000	45,000	1,000	35,000,000	35,000,000	10,000	20,000	530,000
20	Kentucky	1,810,000	130,000	15,000	65,000,000	2,000,000	20,000	4,400	3,000,000
21	Ohio	4,644,000	1,400,000	600	9,000,000	....	......	35,000	5,000,000
22	Indiana	2,350,000	385,000	550	3,880,000	....	......	800	6,400,000
23	Illinois	2,100,000	365,000	600	1,288,000	....	7,500	3,200	615,000
24	Missouri	1,050,000	80,000	10,000	14,000,000	....	......	230	500,000
25	Arkansas	520,000	1,100	......	200,000	20,000,000	......	260	5,500
26	Michigan	4,980,000	260,000	......	......	....	......	1,500	3,260,000
27	Florida	350,000	1,200	......	300,000	15,000,000	700,000	500	300,000
28	Wisconsin Territory	1,080,000	96,000	......	......	....	......	40	350,000
29	Iowa	850,000	40,000	......	......	....	......	......	175,000
30	Texas	200,000	......	......	......	10,000,000	......	......	20,000
31	District of Columbia	20,000	1,800	......	......	....	......	600	......
32	Oregon	......	......	......	......	....	......	......	......
		100,965,000	13,819,900	27,750	220,164,000	1,041,500,000	103,040,500	404,600	324,940,500

REMARKS ON THE TABULAR ESTIMATE.

The table just given embodies the result of our investigations respecting the principal crops of 1847. Unfortunately for us, however, a link has been struck from the chain of dependence which we have sought to establish for some years past in forming our tabular estimates. Taking the census returns for the basis, we had traced the variety of influences which it was supposed might cause an increase or decrease of the amount of the different products embraced in those estimates, and thus brought down the results to 1845. Here our labors were closed for a full year. In this period, however, similar causes were operating, large sales and settlements of lands, and improvement of husbandry were in progress; the effect of the seasons, the increase of population, the influx of immigrants, the operations of trade, all, as before, modifying the calculations to be formed by comparison with the previous years, and creating a new link, to lengthen the connection between the census and the present period. The task and labor on resuming the office once more imposed, of preparing even conjectural estimates respecting the agricultural resources of our country is now still more difficult than it has ever been. No appropriation was made for the collection of agricultural statistics in 1846; it became necessary, therefore, on being again directed to present a report for the year 1847, to perform the double work of reviewing the sources of information for the former, as well as collecting and condensing the accumulated facts of the present year.

To add still more to this complicated task, the lateness of the period, at the very close of the late session of Congress, in which the duty was imposed, deserves notice. This did not allow recourse to the members of the senate and house of representatives, to obtain the names of the various agricultural associations, and of the proper persons to whom the circular of the office might be addressed to procure the information needed. It became necessary, therefore, to recur, in many instances, to those that had been furnished the year previous, with the addition of such others as could be selected from the various agricultural journals, among the warm friends of agriculture and practical husbandmen in different parts of the country. It is not unlikely, that in numerous instances of these persons, removals by death or otherwise, may have prevented their receiving the letters sent them, and consequently, these have fallen into the mass of dead letters, or, at least, have brought us back no response. Among the individuals selected were officers of state and county agricultural societies, farmers' clubs, and men of various classes and professions, whose business would enable them to form a fair judgment of the state of husbandry, and the aspect, progress and success of the crops in the various sections of the land where they lived.

There was another evil we had likewise experienced by the omission of the report of 1846. The various agricultural periodicals which we had been receiving, amounting to some twenty-five or thirty in our country, and twelve or fifteen in Great Britain and on the Continent, were at once discontinued, and on the resumption of our duty in preparing the present report, these including the numbers for that year had to be procured with some delay of time and then examined. In short, to connect the estimates of 1847 with those of 1845, marking at the same time, so far as possible, the progress of agricultural affairs during the interval, it became necessary to crowd, as it were, the labors and results of two years into one.

Difficult, however, as it has been, we have essayed the task and performed it to the best of our ability. The result is contained in the pages of this report. To any one who cursorily runs over the estimates and the remarks which follow, it probably might appear a very easy duty to fill up the columns of a few tables, and gather some 400 pages of matter. The trial, however, would lead to a different conclusion; and, perhaps, a statement of some of the particulars may serve to correct this error.

About 1500 copies of the circular of questions, soliciting replies have been distributed in various parts of this widely extended country. This circular contained, besides the topics embraced in former ones, a variety of particulars in relation to the progress of agricultural industry. To those gentlemen who have cordially responded to our request, the thanks of the country as well as of the office are due. Many of their replies are full, and manifest a deep interest respecting the object in view, and form a very valuable contribution to our means of information. The data thus furnished becomes more reliable, evincing, as it does, the care which has been used in the preparation.

Though the questions referred to the year 1845, as the period for comparison by which to estimate the crops of 1847, yet in the replies, much information has also been received in respect to the crop of 1846. They contain, too, valuable suggestions, facts and hypothesis, and a readiness is expressed to aid in all future attempts to collect similar estimates of the agricultural resources of our country.

Not less than seventy-five or eighty periodicals, some scientific and agricultural, and others more general, from those issued quarterly or monthly to the weekly and even daily records of information, making in the numbers some thousands, have been examined, and everything, however small, which might be supposed to aid in the object noted; a considerable proportion of these likewise were in French and German, and required translation, the difficulty of which is the greater, from the want of suitable dictionaries, embodying technological terms, and the more minute subdivision of many topics in those languages as compared with our own. Some of the valuable discussions drawn from those sources may be found in the appendix, as well as others, condensed and embodied in the following pages. Besides this literature and science of the journals, many valuable works have been added to the library on agriculture and kindred topics both in the English and French or German languages. The aim in this respect has been to select none but those of acknowledged worth, and recommended by persons or journals of high authority, on whose judgment and commendation we could unhesitatingly rely. Many of these volumes have been studied, or if read less carefully, yet so far examined as to observe any thing that seemed appropriate to the object before us.

Among these works, a considerable number relate to statistics in England and on the Continent, and have been studied and reflected upon to gain new suggestions and acquire new methods of eliciting facts, by comparisons and estimates. Numerous references have been made and valuable hints stored up, to guide in conducting our own investigations. The collateral branches of science which bear on the general topic, such as chemistry, botany, geology, meteorology and physiology, have so far as practicable, been likewise kept in view, in our examinaton, and whatever assistance we could avail ourselves of from them in laying up our material, we have used. The territory over which we have had to travel, too, in our researches continually, is vast. At one time a fact must be noted in Maine, then perhaps in Georgia, Florida, Arkansas or Texas, then again in New York or Pennsylvania, Virginia, Ohio, Missouri, Iowa or Michigan, and so of all the intervening states and further territory. Now we must open our memoranda and enter an item on a page of notes on England, France or Germany, then perhaps turn to mark down something relating to Australia, South America or China. Long columns of figures in some cases must be collated, comparisons made, and proportions instituted.

In the notices taken of the crops, as the history of them for their season was forming, reference has been preserved so far as could be done, and in general, to the climate, geographical situation, geological formation and nature of the soil; the influence of increase or decrease of population, and the state of the market to affect the result; the census, maps, gazetteers and descriptions of every kind have been consulted and laid under contribution, to enhance the value of the condensed summary. The amount of labor has been great, and no pains have been spared to render a faithful report. Of our success our fellow-citizens can judge.

The more accurately the bearings of the above, and a multitude of other particulars of much or small importance in their influence on the result, can be developed, the nearer will be the approximation of the estimate to exactness. Care has been taken to guard, more than ever, against the mistakes of the past years, and to improve the best results of former experience. Some claim might perhaps be laid to higher authenticity in the present result of our labors from the fact, that every year with the same original qualifications with even ordinary diligence, and certainly then with almost constant application in the repetition of examinations and comparisons, gives increasing facility and ability for the task. The interest one feels in any subject is generally heightened as he pushes his investigations yet farther and farther; and a sort of enthusiasm is created which seems often to quicken the readiness to catch in a moment whatever relates to it, as the eye travels over pages and columns of various matter and notes the facts that may be immediately or more remotely useful for the purpose.

It would be a species of folly, however, to set up for the result of our labors any higher claim than that of most reliable as a whole, in the present state of statistical operations in this country. From our examinations we are well convinced that many of the random conjectures of published statements based on some one or two elements of calculation must be far wide of the mark. We should deem them too unsafe even for comparative estimates, and still less reliable as independent ones. We doubt not the same imperfection, though we believe by no means to an equal degree, may attach to our own; but it is evident that where regard is paid to the principal modifying elements, the result is, to say the least, more likely to be correct than in a different case. It is believed that injustice has sometimes been done to the agricultural reports of this office, by setting them down as filled with hap-hazard conjectures, unworthy of confidence; and the census of 1840 is mentioned as the only data to which reference should be made. But seven years have passed away, years of manifold changes on our country since those returns were given; and can no allowance be made for their influence; can nothing be done in forming an opinion respecting the development of our country in its agricultural resources?

We may avail ourselves of this reference to the census however, in aiding in our own defence in case of occasional errors. Even this national survey, taken as it is by persons differing as they do in capacity, more or less favorably situated, aided or opposed by the intelligence, or the ignorance and prejudice of those to whom they apply, suffering from all the drawbacks of a natural unwillingness to communicate what is required rather than left optional, must be of various worth in its details, and will be more reliable in regard to some parts of the country than others. The same will ever be the case with any estimates or surveys which embrace so vast a territory as ours, inhabited by people so diversified in origin, disposition and means of information, having more or less inclination to aid or hinder any effort for success in such an enterprise. What has been done however, by our correspondents, has been a willing offer; and as they have been selected for the purpose by their fellow citizens, who from personal knowledge did thus, as it may be said, vouch for their suitableness; it is not too much perhaps to claim for a condensed result of their labors, combined with what we have reaped from other apparently well authenticated sources, the credit of more than ordinary reliance.

And here at this point, it may not be improper to allude to the fact that the extensive distribution of the former reports of this office has contributed not a little to awaken a spirit of inquiry, and fit many to understand what was needed, and to act intelligently in view of the call made on them for information. This we deem of some importance and numerous expressions in their replies to the office, show that they have been conscious of this influence, regard it as favorable to themselves and their fellow citizens, and feel an increasing desire to share in its benefits. It is evident that new views of the ample resources of our country have often been thus gained, and after a most extensive examination of the agricultural and other journals, an almost universal approbation of our efforts has seemed to us to have been accorded.

Preliminary to a more detailed examination of several of the most important crops, there are a few topics which deserve some notice.

It is unnecessary to occupy time in the statement at length of the grounds on which we have proceeded in making up the table, or the particular elements of which it is composed. A reference to the preceding reports, in which these are fully stated is all that now seems needful. We barely remark in addition, that the causes specified may exert a greater or less influence in different years and their operation may likewise be modified by others which may intervene, one or more years, and then perhaps be unknown. A glance at a few leading points comprised in the history of the world, and our relations to the same may not here be without interest or advantage, in prosecution of the object to be aimed at in this report—a faithful representation of facts in respect to our resources in agricultural wealth and its best modes of development.

The *state of the world abroad* has no doubt exercised an influence on the arrangements of our agricultural industry. There has been a greater demand of us for food by the nations of Europe. We leave out of question here all disputed points with reference to great political theories, and confine ourselves to those facts which will be universally acknowledged.

The almost total failure of one crop and the great deficiency of some of the others in Europe, rendered it necessary for those countries where the evil was most severely felt to look to us for a supply. Such was the state of their commercial regulations also as favored the introduction of our produce on more easy terms than heretofore. The demand thus created has had its influence on a people like our own, not slow to perceive any openings for their enterprise either at home or abroad. Their industry has been stimulated, and the prospect of an abundant market has led the farmers and planters in the various sections of our republic to prepare a greater breadth of land for grain and other crops. The recurrence of the same mysterious cause or disease which has so greatly diminished the potatoe crop in our own country has likewise unquestionably turned the attention of some of our agriculturists still more to other products of the soil less precarious and which might be substituted for that well known and favorite fruit of the earth.

The *war*, it might be supposed, by withdrawing numbers, especially in the west, from the pursuits of agriculture, and of producers converting them into consumers, has lessened the aggregate of the harvests and thus balanced the effect of more favorable influences. This cause has undoubtedly had its influence, and must be regarded among others in looking over the operations of things at home and abroad; but the extent of its exercise on the great crops of our country, it is believed has been comparatively small. The number of practical agriculturists taken from their occupations is deemed too few for their influence to have been very perceptible, and the demand of food may not have been materially lessened on this account. It cannot, we believe, be viewed as fairly counterbalancing other and more influential elements, such as those for instance, which are comprised in the variations of the seasons, the improvements in husbandry, and greater foreign demand.

The year opened with unusual promise of activity in business at home and abroad; a prospect which has proved remarkably correspondent to the actual result. Expectation of greater demands from abroad, with a prosperous state of things at home, authorized, it was felt, more than usual effort to meet the requisition of almost starving nations, and a multiplied population of our own. Besides the increased amount already devoted to the winter grains in the previous autumn, the spring and summer seeding, it seems, was considerably larger than usual.

Taking the whole extent of the country, the season of the previous year, (1846,) was favorable; in the large grain districts the crops were abundant, and this, again, may have had a tendency to stimulate agricultural industry, particularly as the outlet for the surplus appeared to be widened. Farmers are proverbially influenced not a little by the effect of one or more favorable or unpropitious seasons. They feel encouraged, when they have been successful, to go on and extend yet more their enterprizes; but if balked in their expectations by untimely weather and lessened harvests, they shrink back, and scarcely feel willing to repeat their experiment. Happily, this year there had been and yet existed that combination and co-operation of causes which dispelled their fears, and emboldened them to plunge the plough yet deeper and farther into and through the soil; and their most sanguine expectations have met, it is believed—looking at the collective aggregate—with a proportionate reward of their labor.

Whether the stream of surplus products will flow wider, or be narrowed down again to its former dimensions, time must determine; but from the best information we can gather, we should be inclined to hazard the belief, that though subject to occasional interruption, the progress of demand upon our agricultural resources will be steady, and with increased needs to be supplied. Facts that we are yearly accumulating seem to justify this expectation.

Unlike many other countries, especially those of the old world, the whole of our population comparatively enjoy the means of livelihood, and are fed from the plenty that abounds in our land. Vast numbers of their poor and starving have sought a refuge among us, and many, too, better provided, have chosen their habitation on the rich and fertile lands of the west and north-west, that are there outspread to invite their residence. Taken in the aggregate, these, while they have added to our population, have probably too increased the amount of products raised among us.

The *emigration* from Europe has been far beyond what it ever was before. By the returns of the collectors of five of the principal ports, to the Secretary of State, the number of persons of this character arriving during the year ending Sept. 30, 1847, is stated to be 233,798, an increase of not less than 82,134 in one year. It is very probable that the addition of others at the smaller ports, and those entering our country by the way of Canada, would swell the aggregate to not less than 300,000, and possibly more. The following table presents the comparison, in this respect, of the last two years:

For the year ending Sept. 30, 1846.		For the year ending Sept. 30, 1847.	Increase.
New York,	98,863	145,830	46,967
Boston,	14,079	20,745	6,666
Philadelphia,	7,237	14,763	7,526
Baltimore,	9,327	12,018	2,681
New Orleans,	22,148	40,442	18,294
	151,664	233,798	82,134

The ratio for the months since Sept. 30, for the whole time has probably increased rather than diminished, though we notice that, as to the port of New York, it is stated there has been a slight falling off. In that port, however, in one of the months since that at which the enumeration above given closed, we have seen it stated the persons thus arriving amounted to about 17,000.

A portion of this emigration no doubt still lingers in the Atlantic cities, and numbers are employed on the various rail roads and works of public improvement still in progress. But the vastly greater number direct their way to the west. A single fact or two shows the influx of population from this source in the north-western states. In general the current flows on unobserved, but now and then some incident transpires, which calls the attention to its ever widening tide. In the catastrophes which have occurred on the lakes and rivers of the west, it is found that a large proportion of the passengers moving westward are foreign immigrants. Thus, in the case of the steamer Phoenix, lost by fire recently, out of three hundred passengers, not less than about two hundred are said to have belonged to this class. This was the fact, too, in the wreck of the Talisman, on her way up the Mississippi. A very large proportion of the passengers were Germans. The Norwegians alone in Wisconsin are said to number not less than 15,000, and many thousands more are expected soon; 8000 more are stated to occupy the northern portions of Illinois. From 50,000 to 100,000 Germans, it has been mentioned, on what appears to be good authority, are preparing to embark for the United States in the course of another year.

Indicative in some degree of the same state of things, we may notice also the *sale of the public lands.* It is true that sale does not of course imply settlement or cultivation, in all cases, and perhaps not even in the majority of them. Still, many who purchase do improve their lands, and large numbers of acres are thus brought into the class of crop-producing areas in the various parts of our country each successive year, and this item is by no means to be neglected in a survey of elements operating on the great results. Thousands of acres, and some of the best kind, are in every successive stage of improvement, and every year takes from them a fair proportion and adds their products to the great aggregate of the harvests. This, in the more recently constituted States, furnishes a large counterbalance to the effect of the disastrous season, and is one reason why, notwithstanding the apparent necessity of reduction in our estimates, we have sometimes put down an actual increase. The sale of the public lands during the past year, as appears by returns to the Land Office, amounted to 2,526,600 acres, principally in the States of Illinois, Indiana, Missouri, Alabama, Louisiana, Arkansas, Iowa, Wisconsin.

In connection with the foregoing topics of immigration and the sale of the public lands, we may advert to another which is also embraced in the table, and forms likewise an element in the preparation of the estimates of the other columns—we mean that of the *population.* In the absence of better data, our calculations as to this item are based on the annual average increase indicated by a comparison of the census for the period of several decennial returns. This rule must however be greatly modified with regard to some of the newly settled portions of our country, which are more rapidly filling up. As a specimen of these we may advert to the estimate of the population of Wisconsin. From reliable authorities we have been induced to set this at about 215,000, and the following table, published two or three months since, is quoted as a proof of the vast difference of the ratio of increase in different periods. The amount for 1847 was put at 225,000, which, by the returns received from that State, we have corrected:

1830,	3,245	1842,	46,648
1836,	11,686	1845,	117,000, estimated.
1838,	18,149	1846,	155,277, census.
1840,	30,945	1847,	210,000, estimated.

At the same rate of increase, it is believed that an additional 5000 will be a small one for the time that has elapsed since the last estimate above given appeared, which would carry the amount up to at least 215,000 inhabitants.

The progress of agricultural knowledge and improvement must not be left without a remark or two, as this is one of those constant elements, which exercise an important influence upon the aspect of our agricultural industry.

This knowledge is diffused in no small degree by the *agricultural journals*, some of which are conducted with distinguished ability, and embody not only selections from foreign works, but also original essays and suggestions of great value. It is with pleasure that we own our indebtedness to many of them for the aid which we have received not only in common with the public in general, but especially by the correspondence and contributions of their editors. The operation of our labors also, in this great field, we believe, notwithstanding the fears of some, has been favorable to the extension of this species of literature. We judge so from the evidence furnished in our correspondence. The spread of knowledge, useful knowledge, more and more widely, claims and ever receives our advocacy. It would be a solecism indeed, were we to act on a different principle, as from this office there is continually going forth, new modifications and combinations of matter, and fruits of genius, to add to the stock of the world's enginery of improvement.

Several new journals devoted to the interests of agriculture have been commenced since the list was prepared, which is found in the report of 1845. Among these, and it is with pleasure we mention them, is one in each of the States of Iowa and Missouri. The former, called the Iowa Farmer's Advocate, a monthly of sixteen large quarto pages, was commenced last August at Burlington, Iowa, at the price of one dollar per annum. The other bears the title of the Missouri Farmer, which we believe is published at St. Charles, or possibly St. Louis, and is a monthly. The Tennesee Farmer and Horticulturist, a monthly of 24 pages, 8vo., commenced in Nashville in the month of September, 1846, and was published at the price of $1 per annum, but we are unable to say whether or not it is still continued.

The Horticulturist also, published in New York, has commenced since our list in 1845.

Another pleasing feature in the progress of this literature, is the increasing disposition manifested by the publishers and editors of the *political and literary journals* to give a column or more to agriculture and its kindred sciences. Many are the newspapers which have adopted this plan, and very generally some of the best suggestions which make their appearance in the agricultural journals, thus find their way to multitudes at remote distances which they could otherwise never reach. The titles of numerous public journals now have associated with them the word "Farmers'," showing the hold which their claims are gaining on the press of our country. We hail it as an auspicious sign, for with these yeomanry of our country, the stalwart sons of the soil, are identified our best hopes of the ultimate progress of our common well-beloved Union.

The press is likewise continually sending forth many *volumes*, as well *original* as *reprints* of foreign works, which are finding their way silently among the agriculturists of our country, and enlightening their minds as to the great principles of the science, and furnishing various knowledge of a practical kind. These aid to train our husbandmen to think, to reason—and although there is still too much prejudice and ignorance, yet we cannot but believe there is a continually advancing progress in the operation of these elements of industrial science on the great mass of our agricultural population. Experiments assume the shape of more reliable attestations to the truth or error of theories, and hypotheses gradually take the form of well-supported systems. The freedom we here claim and exercise, of discussing every thing which presents its claims to be received as favorable to the public welfare, is most admirably suited to bring into exercise the dormant intellects and rouse the hitherto unawakened energies of our fellow-countrymen on a topic so closely blended as is agriculture, with their own and their neighbors' weal.

As another method of improvement, we cannot pass over the numerous, and as we are happy to add, *increasingly* numerous *agricultural societies* and *farmers' clubs* in our country. Many of the States have flourishing state societies, and even where these do not exist, we find county or district societies. As we have already intimated, these associations are multiplying

Every year adds to their number and efficiency. They exercise a happy influence, and promote agricultural improvements in more ways than one. The fairs or exhibitions which usually form one part of their instrumentality, hold out inducements to the competitors to aim at higher excellence. The visit of the committees to the farms entered for premium, naturally calls forth effort to arrange every thing in the best order, to remove unsightly evidences of carelessness and sloth, and to turn every means of cultivation to the best advantage. The spirit of order, neatness, industry, and thrift is inspired, and a new state of things, even beyond their own anticipations, testifies to the presence of an influence perhaps before unfelt. Nor is this all: the subject of it reaps a further and rich reward in the additional value of his products in the market, and thus a real state of prosperity is induced which might possibly not have otherwise existed.

The same effect in a measure attends on all of the various methods by which the husbandman's aim is directed to higher excellence; whether in the exhibition of animals and their products, his skill in driving the plough through the tough soil, or the display he is enabled to make of the various fruits of the earth, which he has brought to win for him the applause of his fellow-citizens. His and their modes of culture, of stock-breeding, of home husbandry, are compared; new thoughts are struck out by the collision of mind with mind; and he must be a casual observer indeed, an anomaly among thousands, if he does not bear back to his own farm or plantation some new knowledge, or some suggestion, that may aid his judgment and better his practice. When men thus meet in masses, and often, as is the case in these agricultural fairs, from widely extended districts, and even from the different extremities of our country; when one great topic is the reigning subject of discourse, and all the arrangements are devoted to promote its discussion, it is impossible that even those of slower mood should not feel their blood quickened, an interest excited, enthusiasm kindled, and a glow of generous sympathy be felt for each other and their kindred pursuits. Those who have worn the badges of their different sects or parties, for a time lay them aside and mingle together as the brotherhood of the soil; and while they learn to respect and esteem each other as sharing in the same great pursuits of life, they smooth down the asperities of conflicting opinions, and the hand-grasp they have given or taken when they beheld or learned to recognize each other in another guise than before, will linger in memory when the scene and apparent pageantry, as it may be regarded by some, has passed away. The influence of this to bind together those from different parts of our Union should not be despised, but be cherished as a hallowed one, which may contribute somewhat to allay the troubled waters and breathe its peaceful spirit, calm, like the pursuits from which it springs, through all the elements of strife, till the voice of its utterance is heard and obeyed.

As a part of this apparatus of means for agricultural improvement, the conventions which are held in the capitals of some of the States during the session of the legislatures, deserve a distinct notice. It is a gratifying sight to see our legislators of the state sovereignties thus meeting for discussion and mutual improvement in this earliest profession of mankind, and we rejoice to perceive that the practice is spreading. Will the time be long before such a convention will hold its meetings during the period of the session of every state legislature, and the practical farmer, and the man of scientific pursuits and profession, as it were together ascend from the arena of hot debate to recreate their wearied feelings in the healthful interchange of their intellectual and experimental stores on the broad and elevated grounds where they may cheer their hearts with the prospect of waving harvest-fields, smiling abodes of plenty, rejoicing flocks and herds, and industrious, happy men?

The reports of the associations and societies, to which we have alluded, belong also, to the literature of this branch of national industry, and form, from time to time volumes of great value for reference, as they embody the results of much practical experience, often, too, guided by science and extensive knowledge. It was our intention to have obtained a list of all the agricultural societies and farmers' clubs in our country, and published it in an appendix; but our catalogue, though a large one, is not deemed yet sufficiently perfect, and it must, therefore, be reserved for some future period. It would be interesting to know the number of their members, the amount they yearly distribute in premiums, perhaps the estimated value of the exhibitions, the number of cattle and other domestic animals, the weight and valuation of the best specimens of these, the average of the finest crops, and a few items more, which might present a bird's eye view of the results of their influence. Probably such a plan may only be accomplished by the gradual ingathering and summing up of years; but we are persuaded that it would form an item of no common interest in a report on the agricultural aspect of our country.

The list of patents during the year, for inventions relating to agriculture, and the numerous and varied collections of implements and machines for the operations of husbandry, wherever opportunities are presented for the display and examination of them, bear testimony to the progress which is continually making in this branch of agricultural improvement. Some of the most common implements of husbandry have undergone a wonderful change in the course of a few years. The pitch-fork, hand-rake and hoe, for instance, how different now from those which were common less than a quarter of a century since. The principles of science have been brought into requisition to mark out the relations and mechanical powers of the separate parts and their combinations; and much cumbrous, useless wood and iron, has been removed, with a gain, not only in lightness, but also of strength. For illustration, we may refer to so simple a thing as the handle of the fork, rake, or hoe. Formerly, these were made of equal thickness throughout, but now it has been seen that where but little force is applied or stress is laid, it may be reduced, provided that the middle, in one case, and the end in the other, be made sufficiently firm and strong. We thus get rid of weight and yet lose nothing, but rather gain in the application of power.

Whether steam, the mighty agent that has wrought such wondrous revolutions in other branches of industry, can ever be successfully applied in general practice to cultivation, and thus produce an entire change in the present modes, would seem to admit of a doubt. In broad level plains, like the prairies at the west, and the savannas of the south, it may be made to drive a plough and furrow up and down miles in a day; but in the mountainous, or even undulating surface, which more generally prevails, it would seem that difficulties must exist to preclude the expectation of deriving from it a similar aid. What may yet be accomplished by different motive powers, less impetuous, though perhaps equally forceful, is a problem yet to be solved. For threshing, winnowing machines and similar stationary operations, the lessening of manual labor may yet be great, and the facility of preparing the grain for the market, exert a strong modifying influence on the prospects of the husbandman. It has been stated that in some of the large wheat-growing districts of our country, the use of harvesting and threshing machines has probably added a considerable increase to the amount raised. The progress of improvement in cultivation is evidently in proportion to the effect of the varied means enjoyed by the community, and one need be but little conversant with the increased applications for inventions relating to agricultural implements, to form a pretty correct judgment respecting the operation of the various sources of improvement we have mentioned.

We might remark on the application of chemistry, animal and vegetable physiology, geology and other sciences, with domestic economy, in reference to this great question of progress, and as elements not without their bearing on the development of our agricultural resources. But these topics may be better touched upon in another part of this report, where we may treat of modes of cultivation and feeding of animals with kindred topics.

There is one particular, however, which seems to claim our notice. This is *agricultural education:* a new era seems, in this respect, to be opening upon us. It may take years before we shall have our Hohenheims, Schliesheims, Tharands and Moeglins, as in Germany and Prussia; but a beginning is made by attempts to establish such schools and colleges. There have been a number of the former set in operation by private enterprise, and in several of our colleges, professors have been appointed who are well qualified to lecture on these subjects. In the time-honored universities of Harvard and Yale, two gentlemen who have enjoyed ample opportunities of pursuing their studies in Europe, fill the chair of the professorships. A man of experience also in science, has recently been placed in this department in one of the colleges of Ohio. Much may be expected from the influence of these and similar positions in relation to this important subject, and here too we may refer our readers to the account given of agricultural education as well as of the agricultural convention at Breslau, by C. L. Fleischmann Esq. This account, with other articles of deep interest to the agriculturists of the United States, may be fouud in appendix No. 1.

Travelling lecturers could likewise do much to diffuse agricultural knowledge. It is an interesting feature which we have noticed of the meeting of farmers' clubs and other agricultural associations in Great Britain, that distinguished scientific men are invited to be present and give their views respecting some topic selected as the subject of discussion. Much information, and of the most valuable kind, is thus communicated in the course of an hour or two, as it is understood the lecturer comes well prepared by a study of his subject. Condensed reports of these lectures and the discussions which follow, may be found in the agricultural journals of England; these contain the principles of manures, the theory of rotation of crops, cultivation of the different fruits of the earth, and methods of stock breeding, and a variety of particulars in reference to the management of the farm.

A similar course is adopted in some degree, in this country, but a greater extension of its benefits is desirable. The more accurate knowledge is diffused among the people the greater their freedom is from error, time will be saved and many a disappointment succeeding to months of toil may be avoided.

SEASON.

It is not proposed to enter much into detail with respect to the weather. The space allotted to this portion of the report will not allow it. Still as the state of the crops are so immediately and mainly dependent on the aspect of the season, it would not be a fair exhibit of the influencing causes were we to leave this topic without notice.

On this subject we may appeal to the authority of Mr. Lawes, an able contributor to the agricultural journals of England, and whose paper on agricultural chemistry, the editor of the London Gardiners' Chronicle pronounces "one of the most important contributions to that science which we of late years have had to record," and says "that the agreement between his argument and the long established conclusions of our best farmers gives us great confidence in its accuracy."

In reference to climate on crops, he says, that although the agriculturist possesses the means of developing the circulatory and elaboratory conditions of plants, (the two which in his view they are required to develope) by manures and mechanical operations, yet *climate* exerts the greatest influence over them. By climate, he states that he means the quantity of rain that falls, the number of days on which it falls, and the temperature during the period when the plant is actively growing or forming seed.

He gives the result of his observations on this point for three years, and although these were made in England, yet as specimens of the similar deductions which we need in this country, we will subjoin them in the hope that persons in different parts of our country may be induced to enter on a like course of observations particularly with reference to the crops.

The period embraced in his table was from the beginning of May till the end of October, and he considered the climate so far as it affected grass, in April and May; the wheat climate to commence with May and end with August; the turnip season to begin with June and end with October. Of course some modifications might be needed in the application of this table to our own particular crops.

	1844.	1845.	1846.
No. of days rain during April and May, (grass season,)	14	36	28
No. of days rain from May to end of August, 17 weeks, (grain season,)	43	71	45
No. of days rain from June to end of October, 21 weeks, (turnip season,)	67	74	65
Inches of rain during April and May, (grass season,)	0.59	3.87	5.19
Inches of rain from May to end of August, 17 weeks, (grain season,)	5.17	9.34	8.41
Inches of rain from June to end of October, 21 weeks, (turnip season,)	10.37	9.62	13.95
Mean temperature during April and May, (grass season,)	52.6	48.9	50.5
Mean temperature from May to end of August, 17 weeks, (grain season,)	60.3	58.2	63.1
Mean temperature from June to end of October, 21 weeks, (turnip season,)	59.4	57.8	62.2
	above.	below.	above.
Temperature above or below average from May to end of August, (grain season,)	0.9	2.1	3.2.

On the above he remarks in substance, that, as will be seen, the two spring months of 1844, were unusually dry, the quantity of rain and number of days in which it fell small. The summer was hot and dry and the air moderately rainy. There being no climate necessary to an increased accumulative and circulating condition of the plants, the favorable growth of the spring crops was prevented; but a hot, dry summer favored the depositing and elaborative condition, and this produced a good quality of grain. In the next year, 1845, the great number of wet days and the low temperature were highly favorable to a circulatory condition of the plant, and therefore green crops of all descriptions and straw, were unusually abundant, and the grain of a bad quality.

In 1846, the spring favored the circulatory condition and the crops of grass and clover were luxuriant. In the month of June, the period when the grain was forming, the temperature was six and one-fourth above the average, and there were only two days in which rain fell, the quality of the grain produced was very fine. On the contrary, the crops of turnips were inferior, owing to there having been thirty-one successive days without rain, twice during the season. From May 21st to June 21st no rain fell, and from August 22nd to September 21st there were only three days rain, being less than one-tenth of an inch.

In another table Mr. Lawes gives the effect of climate on the quantity and quality of produce of the unmanured plots of the experimental wheat field, carried through three years as before, and also the average results of variously manured plots:

	1844.	1845.	1846.
Corn, (i. e. wheat,) per acre, in bushels, pecks and quarters,	16	23	17.3.3
Straw, per acre, in lbs.,	1120	2712	1513
Weight of corn, (i. e. wheat,) per bushel, in lbs.,	58½	56½	68¾
Per centage of corn to straw, (straw 1000,)	821	534	797
Mean of all the plots.			
Weight of corn per bushel, in lbs.,	60¾	56½	63
Per centage of corn to straw, (straw 1000,)	868	499	765

In his remarks on the table just given he says that the effect of the climate of these three seasons, as indicated, is quite in accordance with the general character of these seasons. The lowest weight of the bushel, and the greatest amount of straw were obtained in that season which had the greatest number of rainy days and the lowest temperature; that the least amount of tsraw, with the driest season, and the first quality of grain were in the hottest summer. He considers it highly important that experiments should be tried in different parts of England with reference to the effect of climate on produce. Nothing but a rain-guage and thermometer would be needed as apparatus, and by weighing an acre of the different crops on the farm, and the relation of the grain to straw, leaf to bulb, and estimating the quality of the grain, sufficient data would soon be collected to enable us to speak with certainty on the subject, and the farmer would be able to make an estimate of the quality and produce of his crops, before a grain had been removed from his fields. Even with reference to his own experiments, he feels authorized in saying, that where equal means are employed a farm on which there are a certain number of rainy days in the summer and autumn possesses advantages in the production of green crops, while, on the other hand, where the least number of rainy days and the highest temperature exist, grain of the best quality can be produced.

The views of this distinguished chemist, it is hoped, will henceforth be allowed as a sufficient justification for our gathering and presenting facts respecting the season, which, to some superficial observers, has seemed unnecessary, and a waste of time and paper.

The season which is more particularly important, may, with respect to nearly all the crops, be embraced within the periods of the 1st of March and the 1st of October or November—about seven or eight months of the year—including spring and autumn. The cotton and sugar crop extend yet further—but, with this exception, the products are cultivated and gathered within the time just mentioned. It was hoped that sufficient information might be obtained in respect to the time of planting and harvesting the various crops in the different parts of the country, so as to form the basis of some intended deductions. But this must be left for a future report. Besides the general remarks on the topic of the season, those relating to each individual crop, will likewise, in a degree, embrace this particular.

The winter in general was colder than usual, and complaints abound to some considerable extent of the winter killing of the fall sown grain, on account of the moist ground being early left without its covering of snow, and consequently exposed to be frozen.

The spring was cold and dry; the snows of the latter part of winter lay on the ground longer than usual. In the northern parts of New York and the most northern of the New England states, the public journals speak of large bodies of snow in some instances as late as the month of May.

Thus snow is stated to have been on the 1st of May, in many parts of Vermont and New Hampshire from two to eight feet deep, and on the 4th of May in parts of New Hampshire four feet on a level. In Berkshire county, Massachusetts, snow is likewise noticed late in the season as lying two or three feet deep. Frosts also are mentioned as not unfrequent during the month of May and the early part of June. A hard frost is said to have been experienced at Saratoga, N. Y. as late as the 20th of June, and the weather is pronounced to have been cold and unseasonable at Boston. At the west, too, the winter was long and severe. The Prairie Farmer, published at Chicago, Illinois, in July, mentions that with but one exception there had not been one week's weather up to June 15, when the thermometer ranged above 50° in the shade, and that in the latter part of April and 1st of May, there were three weeks, when the mercury at noon, stood steadily at 38° in the shade; it then grew warmer gradually at the rate of about 2° per week, with two or three short intervals. In Wisconsin the sleighing lasted and was excellent, from 1st of January to 15th of March. After this we find mention of cold, dry and dusty weather.

The same complaint of a cold season and drought, during the months of May and June, is common in the journals of the Atlantic states, even down to Georgia and Alabama. The thermometer shewed an average temperature in New York city, in the month of April at least three degrees lower than in the last two years preceding; the blossoms also were much later than usual.

The Farmers' Cabinet, at Philadelphia, speaks of the cold, dry, backward spring. The quantity of rain there in March, was 4.75—in April 5.85—in May 1.56. In Bucks county, April 30, the weather is described as cold, the ground very dry, and but little rain had fallen for four weeks, and high winds prevailed most of the time. In Maryland, in April and May the drought is mentioned, and cold weather and frosts about the middle of May killed the fruit. Ice made at Ottwell, on the 19th of April, a quarter inch thick. The frosts at the same time extended into Virginia, and at Washington, D. C. and Richmond, the peaches, apricots, &c., were destroyed. Under date of May 12th, it is stated in the Southern Planter, from Lynchburg, that the drought was unusual and there had been no rain for about seven weeks.

As we proceed south, there is also more or less similarity in the notices of the weather during the spring and early part of summer. From the Southern Cultivator we learn, as to Georgia, from every part of the state of an unpropitious and backward season. The spring opened unusually late, there were frequent destructive hail-storms, and north-west winds, with chilling rains till late in May, and cool nights.

The average temperature as given in Georgia, for six months from January to June, for 1847 was 58°—in 1846, 59°, and in 1845, 60°. The amount of rain for six months was 20.71, inches; for 1846, 27.09; for 1845, when the drought was most unprecedented, 7.93. In lower Alabama, as we learn from the Alabama Planter, the months of January, February and March were cold and rainy—April, May and June somewhat more favorable. The month of July, and the first half of August were also very rainy. August pleasant and favorable, and the same was the case as to September and October.

In Kentucky there was drought in May, and the early part of June, though rain enough for the most part of the rest of the growing season. The mean temperature of August was 71.8, amount of rain 2.80; of September mean temperature 66.9; amount of rain 3.94; for October, mean temperature 56°; amount of rain 5.05 inches. In Ohio, as mentioned in the Ohio Cultivator, there were early in January drenching rains, there succeeded cold 10 or 15° below 0. February and March were changeable, at times severely cold, but little sunshine and much rain. April and May seem to have been more favorable, though the drought is complained of as late as the 1st of June. June on the whole was favorable. In July there was great heat until about the 25th, and then it was cool for three or four days. August and September favorable.

The planting in general throughout the country was more backward than usual, and in the early spring serious fears seem to have been entertained that the spring crops could not be got in the ground early enough to shield them from the frosts of autumn. But the summer as a whole seems to have been quite favorable, and alternate succession of warm weather and showers made up for the early drought. The frosts even in the vicinity of Albany, held off till about the 15th of September. The consequence has been that the season was a growing one and the crops of grass, corn, and cotton as well as grain have proved much more abundant than was anticipated.

In the former reports, the plan pursued, was to trace with some minuteness of detail, the aspect of the crops in the different states, from the time of planting or sowing to that of harvesting or gathering. It is still believed that something of the same process is necessary as a part of that combination of elements to which resort must be had to determine with any approach to accuracy, the results of our agricultural industry in the various sections of the country. We do not, however, propose to spread any such collection of data upon our pages, but shall notice as formerly, with less particularity however, the progress of the main crops in those states where they may be ranked as among the heaviest staples, and where the increase or decrease will most largely affect the general result. Several of the crops, it is well known, though raised to some extent in many states, yet are distributed in such small amounts that it is difficult to form any estimate and the bearing on the aggregate for the whole country will exercise but a scarcely perceptible influence on the question of our surplus for home trade or foreign market. Thus twelve states at most, raise 8-10 at least of the wheat crop, a single state more than two-thirds of the barley crop; ten states more than three-fourths of the oat crop; four states four-fifths of the rye crop; four states four-fifths of the buckwheat crop; twelve states more than three-fourths of the corn crop; ten states more than one-half of the potato crop; six states about five-sevenths of the hay crop; five or six states nearly the whole of the hemp crop; eight states nearly the whole of the tobacco crop; nine states almost the whole of the cotton crop; two states nine-tenths of the rice crop; five states about five-eighths of the silk crop; and a single state almost the entire sugar crop. These are the states therefore, that must be relied on for the surplus, if there be any of these products to be exported. The number of these even may be lessened; for in some of these sections of our country, the home consumption will more than require their own crops.

WHEAT.

The states of New York, Pennsylvania, Maryland, and Virginia on the Atlantic border, together with the north-western and western states reaching down to Tennessee, are properly the wheat country of the union. It is very doubtful if more than one-tenth of the wheat crop of the first four named states can be spared for exportation; while in the western states probably one-fifth might be thus appropriated.

Beginning with Ohio, which stands foremost in the census returns as well as in our tabular estimate, we will notice the wheat crop, very much in the order of the amount produced.

We gather the following particulars of the progress of the wheat crop of Ohio:

In this State, as indeed in nearly all the wheat region, especially that of the west, there were complaints of the presence of the fly in the autumn of 1846. The winter in the early part was open, and as the ground was moist and there were frequent alternate freezing and thawing, great apprehensions were expressed that the crop would suffer severely by being winter-killed. These fears proved to have been in a considerable degree well founded, and but for the fact that there had been a much larger breadth than usual sown, the probability is that the amount compared with the crop of 1845, might have been lessened and possibly materially so. The crop of 1846, however, having been large and the prospect of demand most favorable, it is believed that the seeding for 1847 was very much increased. The gradual introduction also of machinery for lessening labor on a large scale, doubtless exerts partial influence, likewise, in this respect.

Some of the statements of the best judges respecting the early appearance of the wheat crop in Ohio, it may be well to subjoin. Among the authorities on which we place much reliance, we would name the Ohio Cultivator. The intelligent editor of that journal seems to have watched the appearance and prospects of the wheat crop, and his numerous correspondents gave him advantages not possessed by every one for so doing.

In the month of January, 1846, he notices the prevailing sentiment that there had been much injury done by winter-killing in March; when the consequences of the evil were beginning to be developed, he states that the wheat crop had been much injured by the winter—the portion above ground was generally winter-killed, and on wet soils the roots also—though on good lands, the roots looked generally healthy. In the northern section of the state too, an intelligent correspondent about the 17th of March mentions, that the tops had been principally killed by winter, the roots also were dead and thrown out of the ground. As the season advanced in April and May, the reports respecting the crop became more encouraging. It looked more healthy, except on moist lands, where it was mostly killed and was backward even where not killed.

In June, it was feared that the wheat would prove light, as the fly had done much injury and the drought had prevented the growth of straw. In Starke, Wayne, and Ross counties, the injury from the fly is represented to have been great. In some of the counties of the Reserve, however, as Medina, Lorrain and Cuyahoga, there was more promise; though even there the crop it was then believed, would be light. On the other hand, in June a journal in Columbiana county gives a good account of the prospect there, and the editor of one published at Cleveland, also speaks as from personal observation on a trip through the northern counties, that the wheat crop looked as well as usual at the same season. In July the wheat fields of Ohio are said to abound in cheat or chess in Licking, Fairfield, Perry and Muskingum counties; where as well as in Brown county, there was also some appearance of rust. Fears too were entertained of a short crop in the Reserve. The weather, however, in the early part of the month was very favorable. In southern Ohio there was a more encouraging prospect. In Lawrence county especially, the wheat crop is said to be remarkably fine in yield and quality. Cincinnati journals speak of some eight or nine counties in the southern division of the state where the wheat had been cut, in which it was believed that what was lacking in quantity would be made up in quality. In the middle of the month, and while the harvest was going on, aided by good weather, the prospects seem to have brightened and the wheat is thought to have turned out better than it was supposed possible—that there was probably a fair average yield, taking the whole state together—the quality was never better. The greatest deficiency it is remarked would be in Richland, Wayne, Starke, &c. counties. Some of the particulars, are as follows:

In Montgomery county the heads were heavy, plump and well filled. What there is, of the best kind, and the yield larger than was anticipated, though it, doubtless, might fall short of other years in number of bushels, in quality it would equal, if not exceed that of the last year.

In Washington county the crop was very light, though the quality was remarkably good. In Trumbull not half a crop. Champaigne county a little more than half an average crop. We learn, however, a fortnight later, that the quantity sown was greater than usual, and that there was great perfection of grain and size of the head. In Ross county the straw is stated not to be long but the grain very plump, large and full, and at least a one-half crop of the first quality. So in Greene county it was thought not to have been an average crop but heavy, the straw was thin on the ground, but the heads large and full of fine, plump and heavy grain.

In Clermont county not more than half an average, but the quality very excellent, and will make up for the quantity.

In Preble the quantity about three-fourths average crop, and it was believed will allow a surplus of 70 to 100,000 bushels.

In Knox county, the wheat crop is said to be a light one, short of an average crop.

In Lawrence and Gallia counties, the early wheat was badly thrown out by the frost; the late sown was a failure.

From other accounts, in August, we learn that there were many good fields in Licking, Knox, Huron, Crawford and Seneca counties. In Marion county there was an average crop. In Delaware it was much winter-killed and affected by the fly. There was a falling off in the Miami Valley, though what there was, was good grain, well-filled and heavy, having no blighted or defective heads; the straw likewise was clear, without rust or mildew. The aggregate, however, was not supposed to be equal to one-half of that of '46.

In Lucas county, it is stated in a journal published in Toledo, that the wheat crop was larger than was expected, and it was considered to be nearly an average. It was, also, of good quality, plump and heavy. In Wood and Hancock counties, on the same authority, it is pronounced to have been a large crop, and of a very superior quality.

Similar was the estimate made in other agricultural journals of the west, through their correspondents. The Prairie Farmer mentions, that in Ohio the wheat crop had suffered severely in some parts, but taking the whole state it was believed there was an average crop.

According to some estimates we have since received, the crop is thought to have been four-fold in Defiance county, and 40 pe cent. more in Erie county than in 1845. In Carroll county, owing to the favorable winter and spring, it is placed at 75 per cent. advance. In Rich and county, 50 per cent.; Lorain, about 10 per cent. in some parts, and about the same, or average crop, in others. In Licking county, about the same, though some think that it considerably exceeds the crop of 1845. The average crop is variously given from 6 up to 20 bushels per acre, though the most common one is 18 bushels, and it is presumed that the average in the aggregate must be at least 15 or 16 bushels per acre; in some instances, as we are told, as many as 40 or 50 bushels have been raised per acre. As the crop of 1846 was much larger than that of 1845, which, as by reference to the report of that year, we estimated at 15 per cent. decrease from the one of the previous year, 1844, it is believed that the crop of this year, 1847, compared with that of 1845, the only data to which we can refer at present, was in the aggregate some 15 to 20 per cent. better than that of 1845—though considerably less than that of 1846, which was a large crop. On reviewing our former estimates, we are inclined to think that in some instances we have placed them too low, though perhaps this is the safer side. We differ in the estimate for 1847, from some good judges in Ohio, and we subjoin, (see Appendix No. 2) for comparison, an abstract of the reports to the state board of agriculture, which, as will be seen, varies somewhat from our information. Our reason for giving an increase, is, from the fact that the large crop of 1846, and the prospects of the market, led to a large increase of land appropriated to this crop, as well as the information we have gathered from every source at our command. The comparison of those reports is with 1846.

The large crop of the previous year, the nearness to the market on the seaboard, and the increased demand for breadstuffs, led to a greater cultivation of wheat in the states of New York and Pennsylvania during the year 1847. The crop of 1845 in New York, it will be recollected, was estimated at an advance of the census returns of the preceding year, made by that State. As the actual increase of the amount raised for the period from 1840 to 1844 is seen by comparison of the returns of the general and state census of these years, to have been at an average rate of 275,000 bushels, and as some allowance must no doubt be made for what was omitted to be embraced—since it can hardly be supposed the census included the whole—it seems reasonable to consider the crop of 1844 at not less than 13,500,000 bushels, and making this a basis, allow a yearly increase of about 500,000 bushels under the ordinary operation of affairs. Of course the increased stimulus afforded by the demand for larger supplies since, may be presumed to have had its effect.

It appears, from the best information we can obtain, that the yield per acre in 1847 was at least an average one. In some parts complaint is made of the fly, and winter-killing is likewise supposed to have reduced the amount per acre one-fourth or one-half, and the average number of bushels is set in these cases at 10, or as low as 7, while in others it is estimated at 14 bushels per acre, and much higher. The spring wheat is stated to have yielded well. One of the agricultural journals estimates the loss of the wheat crop of western New York by fly and winter-killing, at about 20 per cent. In another journal it is said there is scarcely any difference of opinion, that wheat was never better than this year, nor a larger average yield. The crop was probably better in the eastern part of the State; but after making all due allowance for the additional breadth of land sown, we feel constrained to estimate the whole wheat crop of the State as about 10 per cent. less than that which we gave for the crop of 1845, and which we now think was a little higher than we should place it, from the additional information we have gained. We prefer to err by placing it too low rather than too high.

The general aspect of the wheat crop of Pennsylvania, in the earlier part of the season, corresponded to that of many other States, and does not seem to have been promising. As we approach the harvest, the accounts, however, are more favorable. We are told, that there was a much greater extent of surface than usual sown in this State, and that many of the counties would give an average yield. The Lancaster County Farmer speaks of the crop which was sown early in autumn as promising well—the later sown would probably fall short. The same is the statement respecting other portions of the State. In others still farther west, it is mentioned as falling short of the crop of 1846, and not an average yield in quantity, but much superior in quality. The straw is also described as being short and thin, but the heads large and full grained, and that a single ear would give as much as two of the previous year. The accounts we have received at a later date, and since the harvest, are similar, except that they represent the crop in Lancaster and some of the more eastern counties not as favorable, and the decrease from the crop of 1845 as estimated at from 10 per cent. to one-third. The average number of bushels per acre varies as given, from 8, 10, to 18 bushels. As the wheat crop of this State, by the census of 1840, was about 13 1-4 millions of bushels, and taking the whole seven years, it ust be supposed to have increased in consequence of the greater attention directed to it, to meet the increased demand for the supply of the markets, we believe we are warranted, notwithstanding its unpromising character in some of the counties, in placing the crop of 1847 at a considerable advance of that of 1845.

Virginia is likewise a large wheat-growing State, and the prospects are early described with apprehension of a short crop. In the western part of the State, bordering on Ohio, and in those sections which were contiguous to Maryland and Pennsylvania, it appeared much as the accounts from those States describe it. In the interior and the south-eastern counties it yielded better. In Sussex county we are told it was one-third more, and the quality better. In Rappahannock, ten per cent. more. In Princess Ann, the same; and a few instances we have noticed the estimated increase as high as 50 and 40 per cent. The average number of bushels to the acre does not seem to be as great as in New York and the western States. It is given as varying from 4, 6, 7, 8, 9, 10, 12, up to 15 bushels per acre; probably the general average will not hold higher than 8 to 10 bushels throughout the State. The proportion of the crop, it would appear from the census, is about equal between the eastern and western districts, though the western raises somewhat the larger amount. The crop, as given by the census of 1840, was about ten millions. There has been, as we believe, a gain upon this, and we are led to think that the crop of 1847 was in advance of that of 1845. The same was the case with that of Maryland and the southern States, where there must be allowed a considerable increase. In the south-western States of Mississippi, Tennessee, Kentucky, and Arkansas, judging from the accounts given of the wheat crop, the yield was better than usual, and we have estimated it accordingly. We take occasion here to correct a clerical error which has been unfortunately perpetuated in the tabular estimate, from taking down incorrectly the census return of the wheat crop of Arkansas, and yet which, on recurring to the more extended view of the crops, will be observed to have obviously been one. The return of the wheat crop in Arkansas, as given in the census, is about 105,000 bushels. By mistake, it would seem the footing of the column was taken down from Michigan, which stood on the same page, and being unobserved at the time, or since, has been transferred from year to year in the estimate of the crop. We have restored the proper estimate in the table, corresponding to the original basis. This produces a considerable lessening of the aggregate, and should be borne in mind, in comparison of the crop of 1847 with that of 1845.

The wheat crop of Indiana presented much the same aspect as did that of the adjoining states, Ohio and Michigan, at the early part of the season. Complaints were frequent of winter killing, and apprehensions entertained lest the damage should prove more serious than it afterwards did. This may have led to the sowing of more spring wheat than would otherwise have been the case, and the result, in this respect, be more advantageous than it would else have proved. We omit some of the earlier notices, as they correspond much to those already given with reference to Ohio. In June the account is that though considerable wheat was winter-killed, yet the injury had probably been overrated, and in some portions there was a good wheat crop in prospect. As the harvest advanced, the comparative amount obtained seems to have varied in different sections of the state. In some instances there was an evident increase, in others, the falling off from the usual crop of winter wheat is estimated at one-fourth or one-third; the straw was heavy, but there was little grain. The accounts of the agricultural journals, from which we gather the earlier state of the crop, have reference usually to the preceding year, which was a year of abundance in most of the western states. Our later accounts, from answers to the circular, are based on a comparison with the crop of 1845. From these it would appear, that while in some counties the crop is estimated to have been one-fourth or one-third, or even two or three times larger than that of 1845, in others a deficiency is estimated, of not less than one-half, one-third, or one-quarter. The average product per acre also varies from seven and a half, ten, twelve, sixteen, to twenty and twenty-five bushels per acre. The more common average would appear to be from ten up to twenty bushels per acre. Making due allowance for the conflicting estimates, and the various influences which led to a greater extent of seeding, we believe that we are authorized to estimate the crop at an advance of about fifteen per cent. as compared with that of 1845.

In Illinois, passing over the earlier notices, which are, in a great measure, similar to those already given with respect to Ohio, we learn from the Prairie Farmer of July, that, although in the northern parts the winter wheat had failed badly, yet the spring wheat would go far to supply the deficiency. In August the report was more favorable; for the deficiency in quantity would probably be made up by the fine quality, as the heads were remarkably long and the berry plump. Taken as a whole, it is believed that there was a slight advance on the crop of 1845, though it was not equal to that of 1846. In some of the counties the crop was estimated at from ten to twenty and twenty-five bushels per acre; in others, as Macoupin, Jersey, Green, Madison, &c., we find the average stated at about fifteen bushels, although sometimes from thirty to thirty-five; and it is further said the quantity has been increased four-fold in four years, owing to the improvements in getting it out with machines; the present crop, however, was badly winter-killed.

Michigan is considered by one of her citizens, in a communication to the Cultivator, to possess great advantages as an agricultural state. He regards the climate a favorable one, as the extremes of temperature between winter and summer are not so great as in many of the states, further east, of the same latitude. This he attributes to the large bodies of water, which modify the range of the thermometer. The winter lasts from three to four months, during which period the ground is mostly covered with snow to the depth of one or two feet. The ground then is fit for the plough, as he states, about the 20th of March, and often much earlier. About harvest, in July, there is a period of several weeks during which rain scarcely ever falls; a great advantage to the wheat grower, as he is thus enabled to gather his crop with less labor, and free from rust. The soil also is thought to possess some peculiarities which add to its fitness; its extreme depth—the deposit, in some instances, being one hundred feet—and loose gravelly texture, allows of copious absorption, retention and percolation of rain-water, thus providing for abundance of springs, and permitting a wide range for the roots of plants. It becomes also easy of tillage, and is less susceptible of drought. As lime is a constituent part, and there is a good proportion of the salts required, it is again, well adapted to the culture of wheat. The timbered parts especially, are easily cleared and become very productive, yielding from twenty to forty bushels per acre.

The progress of the wheat crop of Michigan, where this product is becoming more and more a staple, is encouraging. The same apprehensions to which we have referred in the account of other states adjoining, existed as to winter-killing but as the season advanced, these forebodings were gradually dissipated. Although the crop may have been somewhat diminished from this cause, yet we are told that in Ionia and Kent counties, the wheat crop in June looked well—seldom better; the prospect of the harvest was not only good, but of being unusually early. In Oakland county, also, the crop improved, and fields which had been despaired of, yielded from five to eight bushels per acre; in that county there was at least one-half the usual average crop; while in the north-eastern and the central counties of Shiwassee and Clinton there is stated to have been a very heavy harvest. The same is mentioned, also, as the fact with respect to the lower part of the Grand River valley, and nearly the entire western half of the peninsula. Some portions of St. Joseph's county, however, suffered from the fly. In the southern parts of the state the accounts are less favorable, and the falling off from the crop of 1845 is considered to have been at least one-half. We have estimated the crop of the whole state at a comparatively less advance on that of 1845, as that was an unusually good crop. Such also we believe to have been the crop of 1846, a greater amount having been sown than was the case of the previous year, and the year 1847 still more. The yield per acre may not have been as great, but we believe this was more than made up by the advance of seeding. The average yield, by a writer whose opinion we have already quoted above, is considered to be at least twenty bushels per acre, and the crop of the year previous, full 15,000,000.

The crops of Iowa and Wisconsin too, which are now coming much more into competition with some of the adjoining states, from all that we can learn proved unusually good. In the estimates furnished us, we find 20 and 25 bushels put down as an average per acre, and in some instances it is thought, that the quantity raised was two or three times as much as in 1845. These states are rapidly filling up with an industrious population, and although the fly did some damage, and the lower tier of counties in both states partook of the character of the northern ones of Illinois and Missouri, yet before the harvest we are told of the promise of a full crop, when gathered in, which seems to have proved the case. We believe therefore we are warranted by the facts in estimating the increase for both of these states at 50 per cent., above the crop of 1845, and we are not certain that it ought not to be placed somewhat higher, and perhaps double.

It is deemed unnecessary to go further into detail in reference to the wheat crop of particular states. Taken as a whole the aggregate crop is probably not as large as that of 1846, better than that of 1844, and not varying very greatly from that of 1845. Many will doubtless estimate it much higher and some persons lower than we have done. We cannot agree however with those who place the present wheat crop of this country at 120,000,000 bushels. The results of the census of New York in 1844, as compared with those of the general census in 1840, would lead us on reviewing the various estimates we have made since 1840, to believe that in some instances we have placed the wheat crop higher than we should now do; though in other instances in the large western states the advance supposed may not have been large enough for particular years, or the decrease allowed too large. As it is, our crop of wheat will probably amount to from 112 up to 114 or 115,000,000 bushels, and will after allowing 10 per cent. for seed, 5,000,000 for stock, give four and one-half bushels to every man, woman and child in the United States, and leave 20,000,000 for export if needed. If we deduct [illegible],000 of our population as under the age of 5 years, and 2,500,000 more of slaves, the ration for the remaining population, after deducting for seed and food of stock, might be for each person above 5 years of age, slaves excepted, at least 5 bushels, and leave as before 20,000,000 for export.

It is gratifying to state that there appears to have been scarcely any complaint of the *rust* in the wheat crop of this year compared to many other years. With here and there exceptions, this scourge of the farmer seems to have been comparatively unknown. It is possible that the partial retardation of the growth of the plant by the late and cold season may have had an influence in preventing its appearance. This disease included among others under the term *brand* in Germany, it appears as abundantly proved by Corda and various writers, is a parasitic fungus which insinuates itself into the ears of the plant or changes the character of its tissues, scatters abroad its spores, and ruins the prospects of the husbandman. Although not immediately owing to atmospheric causes, yet it may be influenced by the state of the weather, and its prevalence to a greater or less degree depends no doubt on the state of the plant in its progress to maturity. An interesting description fully illustrated with plates of the various brands in wheat and the other cereals translated from an essay of the venerable Corda, so celebrated for his investigations into the nature of the parasitic fungi, by a gentleman employed in the Patent Office, may be found in the September and November numbers of the American Journal of Agriculture and Science, published at Albany, N. Y.

One writer, we notice, attributes rust to fog, and advises unless protected by woods, &c. that there should be a high tight board fence erected in the direction towards which the fog originates. Another views it as the result of a vigorous growth of wheat in the latter part of winter or early spring, and that in these circumstances the energies of the root having been exhausted at the time when the grain began to form, and the grain having failed for want of support,—if followed by wet weather the black rust or smut is produced, or if by dry weather the red rust. Should a time of dry weather occur after the early growth and continue on for two months or more before the harvest, and then favorable weather succeed, a second growth with a new set of roots will be produced. He recommends therefore to endeavor and induce this new set of roots, which may be done by pasturing with calves, colts, sheep, &c. He also recommends close pasturing as a remedy against the fly. Such suggestions from the experience of practical men deserve consideration, for though the theories adopted may be incorrect, yet the facts may be beneficial when applied to use. We subjoin a quotation here from the Farmers' Cabinet, describing a method of preparing seed wheat, which is stated to have been used with success for three years.

" Place a half hogshead nearly full of water in a barn, add glauber salts until the water ceases to dissolve them; then take a half bushel of wheat in a bale basket, sink it gradually, stirring it with a paddle until every particle of filth is washed out, which will float on the brine; raise the basket suddenly to throw off the filth; let the brine drain from it; place the wheat on the floor and roll it in newly slaked lime, then run it aside to let it dry a few hours before seeding—skim the floating filth from the brine, and strain it through a colander or fine sieve. By this mode one hand can wash as fast as ten ploughs can put it in.

"In 1843, I received one hundred bushels of seed wheat from the western shore; after seeding more than one-half, I discovered smut in it, and prepared thirty bushels as stated, washing out a quantity of smut and other filth. In 1844 I found the smut much increased in the wheat not prepared; in that prepared, after a careful examination, I found only one smut head; I then examined the grain, and thought I could see a perceptible difference in favor of the prepared wheat.

"In the fall I seeded seventy-five bushels of that wheat, washing only twelve bushels. In 1845, I examined carefully the twelve bushels seeding, and found no smut; I did not examine that not prepared, but found none in it when cleansing it for market. I again compared the grain, and observed, if any thing, a greater difference in favor of the prepared wheat. I also discovered a like difference in a white wheat that I was seeding."

As has been already noticed in the remarks respecting the wheat crop, the Hesssian fly has made its appearance, and caused considerable damage in parts of our country; though not by any means to so great extent as has been the case during some previous years. It would appear, however, that much apprehension is entertained respecting the next year's crop in consequence of the attacks of the fly, which has commenced on the wheat sown in the autumn. These have been so great, it is stated, in some sections of the country, as to lead to the belief that they will be more abundant than ever in 1848. Perhaps, however, this may prove as unrealized a foreboding as the one which went the rounds of the journals in the early part of this year, and which seemed to have been received with more than ordinary credulity—probably owing to the source from which it emanated—and which warned the farmers to expect the almost entire loss of their wheat crop. The prediction to which we have referred, appeared the last spring and was this: the *scab* would be found to affect the crop in 1847, to such an extent that a great scarcity of good flour would prevail; that as an epidemic it would spread over the whole of this country in 1847-'48, appear also in Europe, and pass over the whole Continent, taking the usual course from west to east; that 1847 would be the climax in America, and it would here disappear in 1849, and one year later in Europe.

Time must show what is to be the result respecting the anticipation of the fly, and till then, at least, we may cherish the hope that the danger has been exaggerated. Experience in examining and attempting to reconcile conflicting statements, and draw from them the truth in the case, has taught the extreme difficulty of the task, and the little reliance that can be placed on a few local appearances, especially at a period so early as to allow the whole aspect of the future to be entirely changed. At the same time, we doubt not, that the more precaution there is taken in the selection of seed, and its preparation for sowing as well as supervision of its cultivation will prove an additional security against the various evils which may prove destructive to this most important crop of our country. If it should be that no danger was to be feared, the additional circumspection will not be lost, but be amply rewarded in the increased product, and better adaptation of it to the purposes to which it is applied.

It is highly probable, and indeed certain, we may say, that under the general term "fly," as it appears in the statements of the public journals, are often comprehended not only the Hessian fly, but the wheat midge and other insects affecting this grain. Our farmers, many of them, do not discriminate, or accurately examine; they perceive some insect at work, they are alarmed at the result, and sometimes magnify the danger to their own apprehension by fixing the charge on the alien foe which is said first to have invaded our fields of grain where the mercenaries of Hesse-Cassel planted their feet for the destruction of our liberty upon our soil. Be that as it may, however, this insect has not only to answer for his own ravages but for every other that seems to be of his kith and kin, if their predelictions lead them to fasten upon this particular grain. In a Canada journal we have found the following receipts, which are said to have been effectually tried there as a remedy against the "wheat fly," by which we presume is meant the midge, so often confounded with the Hessian fly.

"Take orpiment, (which can be procured at any druggist's) and with lighted charcoal, burn the orpiment close to the wheat, any time after sunset and before sunrise; at the time when the plant commences to flower it should be repeated, while the fly is found to exist. One ounce is sufficient for six acres."

"Another and perhaps equally efficacious remedy.—So soon as the fly is discovered, or so soon as the plant shows a disposition to open its flowrets, carry around the patch of wheat strong lights at night, and the darker the better—the flies will all rush to the fires and destroy themselves."

Many interesting particulars have been collected during the year relating to the *varieties* of wheat in use in our country, as well as the uncommon growth of individual specimens. An inquiry was embraced in the circular issued from this office, relating to the kinds most approved, and we hoped to have been able to present a classification of them distinguished by their peculiarities and fitness for the various climates of the United States; but this must be deferred, for want of completeness, to another time. It is gratifying to observe that the Mediterranean wheat, which was recommended some years since in the report of this office, still holds its place, to a great degree, in the estimation of its cultivators. We have noted numerous instances in different states and sections of the country in which it is mentioned with high commendation, and its freedom from rust and other evils which more commonly attend on other varieties of wheat asserted. We have noticed among other accounts of this kind of wheat, one in Maryland, which speaks of an extraordinary crop. The mode of cultivation was as follows: The ground, the previous season was devoted to oats, and almost as soon as these were taken off, the manure was carried on, the stubble broken up and well harrowed. It was then left till the 25th of August, at which time it was sown, at the rate of two bushels of seed per acre, then ploughed pretty deep, then a large harrow was passed over it; the first growth is stated to have been destroyed by the fly, but by having an early start, it came out from the root wonderfully, some roots bearing fifty-four or fifty-five stalks. The product of a single grain numbering fifty-two stalks, in one instance was counted, and found to be one thousand three hundred and seven grains, another gave fifty-eight stalks yielding one thousand five hundred grains.

Another person, alluding to the Mediterranean wheat, says that it is proof against the fly, and that its quality, which is sometimes the subject of complaint as inferior to many other kinds, depends greatly on the nature of the soil and time of harvesting. He states that in order to make fine flour from this wheat, it must be cut in a greener state than other varieties, and indeed as early as can be done without injury. As a proof that much also in this matter depends on early harvesting, and the kind of soil, and that a sandy soil is to be preferred to a clay, he mentions the following facts: His first crop was sown on a clay soil of limestone order, and the crop was allowed to get quite ripe before it was cut. His grain in this case was almost as dark as rye. His next trial, however, was made on a soil more sandy, and the crop was cut when the grain was in a pasty state. On being thrashed he found it much fairer, and it weighed sixty-four pounds per bushel. The bread made of it he also pronounces as good as any ever made in his house.

In a third instance, alluding to two heads of Mediterranean wheat, six, and five and one-half inches long, and thus of uncommon length, well filled with good sized plump kernels, the person says that these were taken out of the centre of the field, the land on each side similar, and the cultivation also; except the two lands which furnished the sample. The soil was a heavy clay on a lime rock. The two lands in question were dressed heavily with half decomposed straw. It matured slowly, but the crop he states exceeded any thing he had ever known from this variety, and he attributes the unusual growth to the top dressing. These facts prove that the failure often of particular varieties which have been recommended may be ascribed not so much to the badness of the seed as to the ignorance or want of care in those into whose hands it may have fallen.

The Etrurian, Zimmerman and Red May, are likewise noticed with approbation as well as in the northern sections of the country the Black Sea and other varieties.

Some Oregon wheat distributed with other kinds from this office is highly approved. From one small parcel of a kind thus sent out, a variety has been found bearing the name of the Woodfin red straw, after the name of its successful cultivator, of which the following account has been given. We quote it only in substance. In the fall of 1843, a little paper of beautiful white wheat was obtained from the Patent Office. The number of grains counted were 900; this was seeded in drills and the product gathered in 1844, was one peck and one quart. Unfortunately however, the weevils were suffered to get at it, which so injured it, that not more than three quarts remained sound; from this in June, 1845, was harvested three bushels and three pecks. This again was seeded in October, 1845, on five acres of land, being three pecks to an acre, and the crop of 1846 was sixty bushels; part of this was sold at two dollars per bushel, and part retained. Of eight bushels of this, seeded by one person, it was estimated while in the shock, in July last, there would be made not less than five hundred bushels, worth two dollars per bushel for seed. It is described by its proprietor as plump and fine; a very hardy variety, with a strong, firm stem, less fodder than common wheat, and will stand very thick and uncommonly branching. One bushel is heavy seeding for an acre. Twelve grains of it planted by another person yielded twelve thousand eight hundred grains, and but for some damage from cattle would probably have reached to fifteen thousand. The proprietor estimates that not less than one thousand bushels of this wheat were raised last summer, in the various parts of Virginia and North Carolina from the little parcel received from the Patent Office, in 1843.

In addition to the examples already given of the great productiveness of wheat, the following selection from numerous others may be deemed interesting: though some of them cannot be regarded as furnishing data for common averages, or perhaps such as are attainable in any case on the large scale, yet they show the bountiful provision there is in the laws of Providence for the cultivation of the fruits of the earth; and encourage a greater degree of care in conforming to the conditions required to fulfil what belongs to man in the production of those crops on which so much of human welfare and prosperity depend. They are anomalies; but anomalies occurring according to the regular operation of the powers of vegetable production in circumstances favorable to their development, and as such, are not mere curiosities, but illustrations of some of the wondrous combinations that run through the kingdom of nature and appropriate to a record of facts relative to the action of a fertile soil, and other genial influences on the life of plants and land husbandry. Some of the instances cited it will be perceived took place in our own country and others are derived from abroad.

Robert W. Baylor of Virginia, alluding to the Oregon wheat distributed from the Patent Office, remarks, that a gentleman from Maryland, procured a small quantity and after he had sown it a few times, raised enough to sow four and a quarter acres of ground, from which, in 1845, he reaped two hundred and eleven bushels, being over fifty bushels to the acre.

Mr. Baylor's experiments now commenced with it by seeding one and a half acres of corn ground very late in the autumn of that year with three bushels of the grain, from which, in the harvest of 1846, he reaped thirty-four bushels of good wheat for seed. He pronounces it a valuable variety, with a strong stiff straw, of a very bright yellow color, says that it tillers well, the head is smooth, large and square, and has from four to five grains abreast, of deep red, round, large and full, thin skin and very light bran. Other persons are also mentioned in the same neighborhood as equally pleased with their trial of this variety of wheat.

A gentleman states in one of our agricultural journals, that of a species of wheat which he terms "Hardware Wheat," the product obtained from a single grain which had thirty-seven heads, was two thousand eight hundred and twelve grains, being an average of seventy-six grains to a head; this is said to have been from wheat grown on a lot of newly cleared land, which had never been cultivated but once, when corn (maize) was grown upon it; the soil being stiff white-oak clay, and on the spot from which the selection was made there was no apparent trace of vegetable matter in the soil; many heads from the same lot, he further states, contained one hundred and twenty-eight grains. He mentions an instance likewise, of a gentleman in one of the counties in the same state, Maryland, who from a peck of wheat sown, had reaped nine bushels of most excellent wheat. This was light sandy land, top dressed with coarse barn yard litter.

Other instances are mentioned at different times in the same journal, of one hundred and twenty-one and one hundred and forty-one stalks from a single grain, the heads large and well filled; and again, the first product of two grains is given as five hundred and forty-nine grains, the one three hundred and twenty-five, the other two hundred and twenty, there being eighteen and nineteen stalks respectively.

In Missouri, the product of a single grain is stated to have been seventy stalks, which yielded four thousand grains; this would require but one peck of seed per acre.

Of the actual capabilities of a grain of wheat, we have an interesting report of an experiment tried by Edward J. Lance, of Blackwater, Bagshot, which appears in a late number of the Mark Lane Express. It was made, he states, on a poor sand soil near Bagshot, and it shows what may be done by thin sowing, careful culture, and suitable manuring.

The plot selected was thirty rods which had been clover after rye, and then laid down one year; it was dressed with a mixed yard manure, at the rate of six tons to the acre. The land was dug deeply, the top surface pared off, and put at the bottom of each trench. In the first week of November, 1846, the seed was dibbled in rows of twelve inches by six inches down the row, one to three seed being put in each hole, being about at the rate of two pecks per acre, perhaps rather less. As there are forty-three thousand five hundred and sixty square inches in an acre, and the bushel contains six hundred and fifteen thousand five hundred grains, a bushel would furnish, at the above mode of dibbling, seed enough for more than two and three quarter acres, allowing five seed to a square foot.

The seed was kept under the ground till the end of February, in consequence of the severity of the winter, and thus the grain became a prey to various insects, &c. as the wire worm, grub, &c. When the seed leaves appeared they were extremely weak and most unpromising, many spots not a plant in a square yard, and not more than half of the holes with a plant, but in order to carry on the experiment even with them, Mr. Lance harrowed the ground in March, and then in April, at this latter time working into the ground a mixed manure, consisting of organic and inorganic matters—salts of ammonia, super phosphate of lime, sulphate of lime, alkalies and other bases. In May it was hoed twice with the Vernon hoe. The roots were now tillering prodigiously. But as this took place so late the grain did not ripen early and some of the lower ears did not come to perfection. It was however, reaped before the end of August. Some of the roots had sixty stalks. One root was selected, cut low and weighed, the straw and grain weighed forty-eight pounds—this would give a weight of sixty-eight hundred weight per acre. The roots of this rod on being taken up and the sand shaken out, were found to weigh thirteen pounds, or eighteen and a half hundred weight per acre. The number of roots on the rod was two hundred and thirty-five, not half the number dibbled and seeded, as in a rod there are five hundred and forty-four spaces of twelve inches by six inches. The average number of straws was seventeen, consisting of fifty or sixty tillers and none less than eight. The grain on this rod measured six quarts and weighed twelve pounds. This yield was about thirty bushels to the acre, which is considered very great as compared with the quantity which vegetated, probably more than one hundred and twenty fold. The whole result is thus stated:

	Produce of a rod.	Rate per acre.
Roots and stubble,	13 lbs	18 cwt. 64 lbs.
Number of roots,	235	37,600
Number of holes seeded,	544	87,120
Straw and chaff,	36 lbs.	51 cwt. 14 lbs.
Measure of grain,	6 qts.	30 bushels.
Gross weight,	61 lbs.	87 cwt. 36 lbs.
Weight per bushel,		64 lbs

The same gentleman, in 1843, by sowing one grain early, and subdividing the roots many times and carefully cultivating them, obtained as a product, forty-three thousand grains.

We might add yet other instances, but these may show how much of the seed is probably entirely lost in cultivation. The discussion respecting thick and thin sowing is still carried on in England with a variety of experiments and arguments on both sides.

Experiments have also been tried with respect to the *depth* of planting wheat. Some of those have been given in former reports. We add one more which is stated on the authority of a French work. M. Moreau of

Paris, formed thirteen beds in which he planted one hundred and fifty kernels of wheat at various depths.

The result was as follows:

At the depth of	Came up.	No. of heads.	No. of grains.
7 inches,	5	53	682
6¼	14	140	2,520
5¾	20	174	3,818
4½	40	400	8,000
4½	73	700	16,500
3¾	93	992	18,534
2⅗	123	1417	35,434
2⅓	130	1560	34,349
2	140	1590	36,480
1¾	142	1660	35,826
1	137	1561	35,072
1½	64	529	10,587
On the surface	20	107	1,600

By this experiment the maximum as the number that came up was 1 3-4 deep, the minimum at 7 inches; the maximum of the number of heads also 1 3-4 deep, the minimum 7 inches, but the maximum of the number of grains was 2 inches deep and the minimum 7 inches deep. The range from 2 3-5 inches down to one inch, varies in those that come up only about 20, for the extremes of maximum and minimum of the heads 243, of the grains 2131. Between 2 1-3, 2 and 1 inches of those that come up, there is only a difference of about 10 at most; of the heads, only 30; of the number of grains, 1476.

Looking at it, however, in another light, we may rank the depth of 2 inches best, then 1 3-4, then 2 3-5, then 1 inch, then 2 1-3 inches. After 4 1-2 inches the falling off of the product is 1-2; from 1-2 inch to the surface it reached to 9-10. There may have been extraneous causes influencing the difference between 2 3-5 inches and 2 1-3 which seem to vary from the general rule; but it may doubtless be considered so far as this experiment goes, that the grain should not be sown at much greater depth than 2 inches, nor nearer than 1 inch from the surface. The difference to be allowed should respect the season, the nature of the soil, &c.

As to the *mode of judging* of wheat, we are instructed by a high authority that the dimpled end of the grain should be distinctly marked, and the point from which the little roots proceed should be somewhat prominent; the end from which the blade springs should also be slightly covered with hairiness or wooliness. The little protuberances at either of those ends must not have been rubbed off, as the grain is thereby rendered unfit for seed, as it has lost its vitality. Kiln-drying also destroys its vitality, and such seed as has been kiln-dried will be indicated by the unusual hardness of the grain as well as its smoky flavor. The surest way, however, is not to rely on the point of hardness, but to germinate it near the fire in a glass with as much water as will swell the grain. If damaged by salt water, its taste will be saline, and if for the purpose of remedying it has been washed and dried it will lose its bright and have a blackened appearance. Wheat that has been heated in the stack will taste bitter on being chewed, and if long-kept in the granary, smell musty and look dull and dusty. If eaten by the weevil it may be detected by pressing the kernel with the fingers.

More attention undoubtedly should be paid to the selection and preparation of seed; and reference should be had likewise in this to the nature of the soil, climate and modes of cultivation. As a general rule it is believed to be well established that grain of northern climates will succeed better in southern than the reverse. Some interesting experiments on the different varieties of grain are mentioned as having been tried by Gen. Harmonon of Wheatland. As he is a well known and experienced wheat grower, they are of value, and we therefore refer to them. See Am. Agriculturist for Sept. 1847.

There is, however, in almost all experiments tried in our country, too great want of the precision of the European ones, and especially of those of Germany, where every thing is reduced to the rules of economic proportions, and valuable deductions can be made on account of the regard paid to the most minute particulars which may affect the result. In the communication furnished to the office by Mr. Fleischmann, contained in appendix No. 1, may be found some interesting facts respecting the wheat crop of Germany, and in Mr. Ellsworth's letter also, in Appendix No. 16, some remarks respecting the same subject at the west.

The remarkable fact is mentioned in Silliman's American Journal of Sci ence, that in the north of Russia where the mean temperature is as low as 26° Far., all the cereal grains are cultivated with success, although there are only two months and a half or three months between ploughing and harvest, and in some cases the soil was frozen to the depth of 7 feet, and near the place mentioned, on penetrating the ground, it was frozen to the depth of 175 feet.

The attempt has been made to convert wheat from an annual to a perennial plant, and it is said, with some good degree of success. The account given, is that was discovered by the steward or director named Kern, of an estate at Constance. After he had ploughed and manured the land, he then sowed it with summer or winter wheat. In the spring, before the ear makes its appearance, he mows it. This he does repeatedly several times in the course of the season, using it as a kind of hay. After this he allows the plant to grow, and be harvested as usual. The next year it ripens earlier and bears a much larger crop than wheat cultivated in the usual manner. In autumn it is manured like the grass of meadows, and in the spring the weeds are removed. The effect is stated to be such that from one field four successive harvests have been gathered. The subject is one of considerable interest, as no doubt, if rendered perennial, it would be useful for the purpose of forage. It might be well for some of our enterprizing farmers to test the principle, as it is so easily done, and fuller information relating to it is needed. We have sought for some more satisfactory history of the matter, but as yet have been unable to light upon any thing which will give it. At present it is too vague to entitle it to much reliance, though the particular fact does not appear to be at variance with analogy in regard to improvements, quite as great of numerous plants, by particular cultivation.

According to Kreyssig, the color of wheat and strength of the cuticle depend on the proportion of clay in the soil. Thus he states, that on a mild soil, the skin is much thinner, and it is whiter; on a heavy soil thick, and the color more yellow. The yellow has the heaviest kernels and shells out more, but in equal measure gives less flour than the white, which is more delicate and more exposed to the brand

A mode has been invented by S. Bentz, of Boonsboro', Maryland, of hulling wheat and other grains, so as entirely to remove the outer skin, by which a pure white flour is made unmixed with the usual bran. The advantages claimed for it are, that a saving in time in grinding is effected of from 25 to 50 per cent., and of 40 to 52 lbs. of wheat in each barrel, and that it is rendered capable of enduring the heat of hot climates. Mr. Bentz supposes that the fine particles of bran remaining in the ordinary flour is the reason why it sours. Specimens of grain, before and after his process, and also of the bran and hull removed, have been furnished the Patent Office, and the method has received the high commendation of gentlemen engaged in agriculture. A reference will be perceived to it in the letter of Mr. Ellsworth, formerly commissioner of patents, to which we have already referred, and which will be found in our appendix, No. 2. He speaks very favorably, not only of its application to wheat, but also of a successful experiment with buckwheat. For Mr. Bentz's letter, see also appendix, No. 2.

It may be, however, that the advantages of removing the bran, as respects appearance, will be counterbalanced by its being less nutritious, as it is well known, the finer and the more bolted the flour, it is thought less easy of digestion. With respect to the fat-forming principle, it appears, by the analysis of Professor Johnston, the proportion of the different parts of the grain stands thus:

1000 lbs. of whole grain contains	28 lbs.
" " fine flour, "	20 lbs.
" " bran, "	60 lbs.

The bran is therefore, much the richest in this principle, and the whole grain ground together is nearly one-half richer than the fine flour.

As to the muscular matter, it is stated that,

In a thousand pounds of whole grain, there is	156 lbs.
" " fine flour, "	130 lbs.

Respecting the bone and saline material,

Of a thousand pounds, the bran contains	700 lbs.
" " " whole meal,	170 lbs.
" " " fine flour,	60 lbs.

In this respect, therefore, the bran is vastly superior, and the whole meal has nearly three times as much nutriment as the fine flour.

Taking the whole three substances together, according to Professor Johnston, of a thousand pounds, the three substances contain, of the ingredients mentioned:

	Whole Meal.	Fine Flour.
Of muscular matter,	156 lbs.	130 lbs.
Of bone material,	170 "	60 "
Of fat, "	28 "	20 "
	354 lbs.	210 lbs.

And so, in this respect, the whole meal is one-half more nutritious than fine flour.

The difference of flour, in the making of bread, is often very great. Mr. Lance, in a lecture on agriculture in England, stated that a sack of inferior flour, weighing 280 lbs., would generally make 80 four-pound loaves, the increase of weight being 40 lbs.; but a sack of superior flour, of the same weight, has been known to make 93 four-pound loaves, or the gain is 92 lbs. A very glutinous flour will absorb by far the most water. So that 3 lbs. of flour will make a four-pound loaf.

We might add a variety of interesting particulars respecting the *culture* of wheat in the various parts of our country; but we should extend this portion of the report too greatly; we shall therefore only allude to one or two. Mr. Pell, of Pelham, N. Y., is stated to have tried the following experiment respecting wheat. On the 4th of October he cleared the tops from a potato field, burnt them and returned the ashes, with the view of sowing wheat. The seed was prepared thus: soaked four hours in brine that would buoy up an egg, then scalded with boiling hot salt water, mixed with pearl ashes, passed over a seive, distributed thinly over a barn floor and a dry compost sifted on it, composed of the following substances: oyster shell lime, charcoal dust, oleaginous charcoal, ashes, Jersey blue sand, brown sugar, salt, Peruvian guano, silicate of potash, nitrate of soda and sulphate of ammonia. The sun was permitted to shine upon it for about half an hour, when the particles became, as it were, chrystalized upon the grain. In this state it was sown at the rate of two and a half bushels to the acre, directly on the potato ground, from which the tops had been removed and ploughed under to the depth of five inches, with a Scotch plough, harrowed once, a bushel of timothy-seed sown to the acre, and harrowed twice; at the expiration of fifteen days the wheat was so far above ground as to be pronounced by a neighbor far in advance of his, which had been sown in the usual way on the first of September, thirty-four days earlier.

The flour made from this wheat, which weighed nearly sixty-five lbs. per bushel, received the premium. Its superiority was owing to the enormous amount of gluten it contained—eighteen per cent.—after having been dried by an air pump over sulphuric acid. His manures were applied for the purpose of producing gluten. It may be as well to say that a composition made by Mr. P., containing thirty different chemical substances, was spread broad cast over the whole field before the wheat came up, at an expense not exceeding three dollars. The yield per acre was somewhere about 70 bushels.

A practice is also mentioned in a western journal, which appears to be worthy of imitation. It is as follows: The grass seed which has shed out, is from time to time collected and also sown among the wheat, from March to the middle of April, as may be expedient. When the wheat is harvested, the farmer thus has a good coat of grass which may be pastured for a few weeks.

The cattle are then turned off, and the grass allowed to grow. The next spring and summer he leaves the field fallow, and then in the autumn ploughs it, and seeds it again to wheat. In this way, for twelve years, he has raised wheat from the same ground with no other intervening crop and with improved appearance of the same.

There is one more consideration which deserves some attention in relation to the wheat crop. The bushel of wheat weighs less some years than it does others, and the difference often amounts to two, three, or even four pounds. Though this may seem of comparatively little consequence for a few bushels, yet for the aggregate of the wheat crop of the United States, or for a state, or even a county, it makes a great difference.

Suppose, for instance, one year the crop of the United States should amount to 110,000,000 bushels, and weigh but fifty-nine lbs. per bushel, and in another the quantity should be but 108,000,000 and yet weigh sixty-two lbs. per bushel; the last crop, though less in quantity by two millions of bushels, would exceed the former in weight by 200,000,000 of lbs. But this is not the whole state of the case. We learn from good authority that a bushel of wheat, weighing fifty-six lbs., yields but 46¾ lbs. of flour, while one weighing sixty-two lbs., yields 53½ lbs. On this supposition a still further allowance must be made, enhancing considerably the value of the millions of pounds above mentioned. Were we to estimate the product one year at 110,000,000 bushels, weighing only fifty-six lbs., and another at 108,000,000 bushels, weighing sixty-two lbs., then the difference in favor of the latter, though the least in quantity, would amount to 536,000,000 pounds in weight, or more than one million and a quarter of barrels of flour.

The following, from cheques of different dates, in 1840, with respect to wheat ground at Cupar, Great Britain, exhibits at once the difference in wheat according to the various weights of the grain per bushel:

Date.	Wheat sent.			Goods returned.				Total loss.	Per bushel.		Wt. pr bush.
				Flour.		Bran.					
1840.	bush.	cwt.	lbs.	cwt.	lbs.	cwt.	lbs.	lbs.	lbs.	oz.	lbs.
Jan. 16	120	63	0	53	26	8	65	133	1	1⅔	59
19	56	30	28	25	16	4	61	63	1	2	60½
22	80	40	66	34	20	5	70	88	1	1½	56¾
27	120	63	91	52	77	9	105	133	1	1⅔	59¾
30	120	63	28	53	20	8	102	130	1	1⅔	59¼
Feb. 15	240	130	21	108	46	19	10	301	1	4	61
24	96	52	92	44	64	7	0	130	1	5⅔	61½
28	240	126	14	106	9	17	12	329	1	6	58¾
March 3	48	26	10	21	66	4	4	52	1	1½	60¾
5	240	129	14	108	36	18	23	301	1	4	61¼
8	120	60	0	50	14	8	42	168	1	6	56
10	128	70	70	60	100	8	62	132	1	0½	61½
19	56	30	49	24	101	4	102	60	1	1	60½
20	240	127	56	106	24	18	48	318	1	5	59
27	120	26	35	51	43	9	61	145	1	3⅓	58
April 1	96	52	56	44	44	9	18	106	1	1⅔	61¼
8	56	30	18	25	16	4	56	58	1	0½	60½
24	240	128	64	106	80	19	0	320	1	5⅓	60
27	56	30	105	25	64	4	90	63	1	2	60½
May 8	168	92	70	79	22	11	84	188	1	2	61¾
22	240	129	84	107	36	19	84	300	1	4	60¼
28	120	60	0	50	40	8	0	184	1	8½	56
June 15	160	82	21	67	70	13	0	175	1	7½	58
22	240	127	60	106	91	18	0	305	1	4	59
July 13	240	128	64	106	102	18	94	316	1	5	60
20	200	11[illegible]	80	95	89	13	66	199	1	0	62
27	160	82	96	68	22	13	0	186	1	0	58
Aug. 3	240	128	64	107	34	18	84	282	1	2½	60
10	240	127	98	105	44	20	2	276	1	2⅛	60
14	200	110	80	94	52	14	34	218	1	1½	62
24	240	128	64	106	44	19	42	314	1	5	60
31	240	129	36	106	92	19	84	308	1	4½	60⅓
Sept. 7	160	82	96	68	21	13	7	180	1	2	58
14	240	128	64	106	98	18	105	309	1	4½	60
17	120	65	50	54	68	9	66	150	1	4	61
24	80	42	56	35	34	6	22	112	1	7	59
Dec. 2	40	21	65	18	15	2	108	54	1	5	60½
Total.	5,800							7,096 average	1	3⅓	

BARLEY.

From the best information we can obtain, we are inclined to believe that the crop of barley this year was better than in some former years. So little notice, however, is taken of it, on account of its small amount, in comparison with many others far more important, that it is difficult to ascertain its progress. A word or two only is sometimes given to it, in the accounts which we find relating to the appearance of the crops. It is raised in small patches, instead of covering hundreds of acres in close neighborhood. Of course it attracts but little attention; the product of the previous year is hardly recollected, and no deep interest is felt in its success. With the exception of New York, the quantity raised in the United States would not be worth trying to ascertain. Its use is mainly for malt purposes, and the claims of temperance seem to have contributed very much to lessen the whole.

In the state of New York, which furnishes three-fifths of the whole of this crop, while in instances there seems to have been a falling off, yet in general the reports are favorable, and compared with the crop of 1845, it is thought to have been twenty per cent better. In the New England states, also, there has been a slight increase, while in Pennsylvania the reports indicate that less attention is paid to it than formerly, and probably the crop of this year was a little less than that of 1845.

In Ohio it was, as it would appear, better than last year, and therefore an advance on the crop of 1845.

We are inclined to believe, that in some of the states attention is turned more to barley, not so much for the direct product of the seed, as for the purpose of fodder, and that this may likewise inadvertently cause an increase in the whole amounts. We notice that in some cases where the wheat did not do well, barley is reported as quite successful, and have given a slight addition on the whole to the aggregate crops. In giving our tabular estimates, in this as well as in all the other crops also, we have used in most instances the round numbers as more convenient—and after the best examination we can give to the subject, we believe there has been an increase in the whole crop of about ten per cent. at least.

In the report of 1845, some observations were made respecting a variety of barley called the Emur barley. A letter from Henry Brewer, Esq., of Enfield, Tompkins county, N. Y., who was referred to at that time as having raised it, informs us that he has been quite successful in its cultivation. He says: "This barley originated from one bushel brought from Scotland in the summer of 1829, by a Mr. Gibbs of this county, and has not degenerated by sowing, as many kinds of foreign grain have heretofore done. This kind of barley has been little used for the food of man, and as yet no call has been made for it for the purposes of brewing. I have used it for the table instead of buckwheat, prepared in the same way. The miller mixes all the kernel in with the flour, and then it makes excellent cakes; a number of persons have eaten of the cakes prepared from this kind of flour, and prefer it to buckwheat, especially such as are dyspeptic, or whose stomachs are weak.

"We have used it for the last two winters. This barley is a four rowed variety, and is sowed in the spring and is ripe about the same time as the other varieties. It yields about the same as the other kinds, and weighs sixty lbs. per bushel."

We perceive that recently some of the agricultural journals are mentioning, as a new species of barley not before brought to the notice of the American public, called the *Nampto barley;* but this is a mistake, as it it was referred to in two previous reports of this office, under the name of the Himlaya barley, and efforts have been made, though unsuccessfully, to obtain the seed. Different accounts are given respecting it in European journals. By some it is very much extolled, while by others it is as greatly depreciated. Probably the difference of views respecting it may be traced to the difference of soil or modes of culture by which it was tried. Some of its qualities, if found to be sustained by proof, would render it a valuable accession to our cereal products.

According to the analysis of Mr. Wray, the parts of the ash barley are given as follows:

	Seed.	Straw.
Potash,	19.1	24.4
Soda,	——	1.0
Lime,	3.6	9.6
Magnesia,	7.6	1.7
Chloride of sodium,	2.3	8.25
Phosphoric acid,	31.2	1.8

The proportions of potash and soda are given differently however by Kœchlin, Bichen, and Schmidt:

Potash,	13.30	3.91	20.91
Soda,	6.53	16.79	——

In the Transactions of the Highland and Agricultural Society of Scotland for 1845, a new variety of barley is mentioned which is said to be characterized thus: First—up to the time of ripening the skin maintains a glossy whiteness, without the slightest streak of brown, while all the other varieties are marked more or less by a brown tinge, the ridges of the grain being uniformly streaked with a brown line. Second—the brighter color and greater strength of the straw than in the common varieties. Third—the greater distance of the grains from one another on the ear. So that an ear of the new variety, with twelve grains on each side, will be found fully three-quarters of an inch longer than one with the some number of grains of either the Chevalier or early English kind.

Some of the advantages are stated to be—the *superior productiveness* of the new variety, and, for light soils, the *length of its straw.* Its *tillering properties* also deserve notice, and, for moist places, where it is apt to sprout after being in the stock, *the distance at which the grains are placed from one another on the ear*, is regarded as a valuable qualification, since moisture cannot obtain a resting place nor be so long retained as in the ear which is more compactly constructed.

The variety of barley called the Cheltenham six-rowed, black-skinned, is very highly commended in theMark Lane Express. It is hoped that the attempt to procure some of this from England, for distribution from this office, may prove successful. Of this kind it is said to be probably a native of Abyssinia. A person in Cheltenham, in December, 1843, dibbled a few grains on a small piece of land, and notwithstanding the severe winter of 1843–4, and the extreme drought of the summer of 1844, the crop was an extraordinary one. On the 4th of February, 1846, he drilled and dibbled it again, five pecks to the acre. On the 4th of July it was reaped, fifty-two bushels two pecks to the acre, weight fifty-five and a half lbs. per bushel. The next produce, in 1846–7, was an average one to the acre of sixty-eight bushels, weighing fifty-five lbs. The plant is considered quite hardy, its flour is excellent and makes nice bread, which will keep moist for weeks, and, if mixed with wheat flour, is very superior to the taste. The straw is also strong, fine, fit for plaiting, and cuts into excellent chaff. Other instances of its great productiveness also are mentioned. A gentleman, from seventeen grains obtained 17,235 as the first product. Another person, from fifteen corns, obtained two hundred and ninety ears, which yielded 20,880 grains.

OATS.

It is believed that more land than usual has been devoted this year to this crop. It is not sown, however, exclusively for seed, and, in some of the reports we have received respecting it, the estimate made is in tons of hay derived from it. This is the case especially with reference to the south-western states, where however comparatively little attention is paid to it. As a general thing, we should judge the crop not to have been as good for the year comparatively in the northern and eastern states, as in the southern, western and north-western. The average amount per acre in the northern states, is put down as varying from thirty up to fifty, eighty, and sometimes one hundred bushels.

Probably the aggregate average might be reckoned at from thirty to forty bushels per acre. In the southern middle, and southern states, it will not, it is believed, exceed ten bushels, and about the same in the south-western. In the western and north-western again, about twenty-five, thirty, forty, and even up to fifty bushels per acre are mentioned; the aggregate average, perhaps, is about thirty bushels.

The crop of oats in the state of New York, taken per acre, was probably not as good as in 1845, but as a whole we suspect the past two years have caused a small advance in the amount raised. In some portions of the state it is mentioned as having fallen off one-third or one-fifth, while in others the increase is judged to have been perhaps as much larger. In the New England states, as it is generally a favorite crop, it seems to have had its usual attention, with a slight increase of area devoted to it, and, on the whole, to have gained on the crop of 1845.

The oat crop of Pennsylvania seems to have suffered in the early part of the season and it is thought yielded less per acre than usual. The estimate of decrease from 1845, in some instances, is placed as high as one-fourth or one-third of the crop. In others however it is much less, not more than one-tenth, and in some sections a gain is reported.

Taken as a whole, from the best information we have been able to obtain, there must have been some decrease and we have accordingly so estimated it.

Virginia raises a considerable crop of oats and for the most part the reports respecting it, indicate a very considerable increase. In some portions of the state towards the south-eastern section there was a decrease, but in the interior and western parts it was much more successful. It will be recollected that the crop of 1845 was a poor one, and it would appear that the crop of 1847 in those places where it proved most successful was double of the former one. This however would be too great an increase probably for the whole state, and we have therefore placed it at about one-quarter more.

Proceeding south, although the quantities raised are not large compared with many other crops, yet owing to the better season they ought to be considerably increased. Keeping in view the census estimates and the past history of the crop in the state since that period, we have endeavored to form our conclusion respecting it as well as we might. It does not however command that attention in the reports which have reached us, which enables us to speak with so much certainty respecting it, as others which are more in favor. The aggregate amounts here however, will not very greatly affect the whole result.

The crops of Tennessee and Kentucky we should judge were good. The increase in some instances is put as high as twenty per cent. This however would seem on comparision, to be somewhat too large, and we have estimated it accordingly. In Ohio, with scarcely an exception the information we have received respecting the amount of the oat crop is favorable. This corresponds too, with the reports to the board of agriculture of that state, to which we have before referred. In some instances our correspondents placed it at double the crop of 1845, and even larger. As a general estimate it is believed to have reached as high as fifteen to twenty per cent. It is possible, however, that we may have overrated it in 1845. Similar is the report respecting Indiana and Illinois. . There was a far larger crop of oats if we may judge from the information received in 1847, than in 1845 in parts of these states. We are inclined to believe, that in these and all the northwestern states, the increase in this crop has been steady for a number of years. The demand for oats has doubtless increased and this not merely for home consumption, but for export to some of the other states. It is impossible to form any very accurate conclusion as to this latter fact, as in many instances oats are included in the list with "other grain."

We should judge that considerable attention is paid to the raising of oats in Wisconsin and Iowa, as well as Michigan. The crop appears likewise to have been a successful one during the year 1847. On this account we have felt warranted in allowing a considerable increase on the aggregate amounts of these states. It is unnecessary to go into particulars, as the estimates, though in a high degree favorable, vary however from thirty to fifty per cent.—even up to twice as much.

The entire oat crop for the United States it will be seen is thus larger than that of the year 1845. In forming our estimates of this crop, however, we labor under the difficulty which we have felt with respect to all the others. It is not easy for persons to keep up a true recollection, except in general, of the appearance of a crop two years past. There is another consideration which may be mentioned here, which probably has an influence on the amount furnished. In some parts of our country it is the practice to appropriate a poorer kind of land to this crop. The average number of bushels per acre, therefore, is not so large as it might be. It is not raised in large and extensive fields, but a few acres at the most, and generally less are devoted to it on a farm. Many persons do not pretend to do more than raise enough to supply their own consumption. Possibly the effect of rail roads in withdrawing numerous lines of stage horses from the public conveyances, may have had a partial influence on the comparative increase in some parts of our country, as it is well known that the consumption of oats by them is large.

In a former report we presented an extract from an English journal respecting the weight per bushel of some varieties of oats. The following table relates to the analyses of a number of the same varieties including also one other—the common:

Species of Oats.	Husks.	Starch.	Gluten.	Album'n	Salt, Sugar, Gum and Oil.	Water.	Total.
Hopetown	22.5	54.0	1.7	2.1	3.6	16.0	99.9
Common	23.2	51.8	1.0	0.8	7.2	16.0	100.9
Potato	21.6	55.0	1.5	1.9	4.0	16.0	100.0
Landy	22.5	53.2	2.0	1.9	4.0	16.0	99.6
Black Tartarian	23.9	51.9	1.1	0.6	6.5	16.0	100.0
Siberian	26.9	49.7	1.1	1.8	3.9	16.0	99.4
Early Dyock	22.4	53.0	0.9	0.1	6.4	16.0	98.2
Early Angus	22.6	52.7	1.5	0.5	6.0	16.0	99.3

The inorganic constituents of the plants are given by a number of analysists, as follows:

	Seed.		Straw.	Salm.	Horshmer
	Boussingault.	Knop & Schned.	Levi.	Seed.*	Straw.*
Potash	12.9	13.6	12.18	20.40	43.90
Soda	–	–	14.69	1.90	4.00
Lime	3.7	1.3	7.29	3.15	4.84
Magnesia	7.7	8.6	4.58	14.30	3.44
Phosphoric acid	14.9	16.5	1.94	42.54	0.51
Chlorine	–	–	–	–	6.80
Sulphuric acid	–	–	–	1.70	4.50

* Grown in soil containing no humus.

The most perfect analysis of this plant, however, is that contained in the essay of Prof. Norton, for which he received the premium of the Highland Agricultural Society. This was published by the society in the volume of their Transactions embracing the period from July, 1845 to March, 1847, and is a fine specimen of analysis conducted on scientific principles. Prof. Norton took the plant at different stages of its growth and examined carefully into its constituent parts. His figures differ from those above given, as also from the analyses made by other persons. Thus, for example, of the grain:

	Potato.	Hopetown.
Starch	65.60	65.24
Sugar	0.80	4.51
Gum	2.28	2.10
Oil	7.38	5.44
Casein (avenine)	16.29	15.76
Albumen	2.17	0.46
Gluten	1.48	2.47
Epidermis	2.28	1.18
Alkaline salts, and loss	1.75	2.84
	100.00	100.00

RYE.

This likewise is one of those crops which are raised in small quantities, and the greater portion of which is confined to a few states. It is likewise a product which, since its use for distillation has been very much abridged, and does not seem to be in much demand. This fact has contributed to lessen its proportionate increase. It is sometimes, however, on account of being considered the hardier grain, resorted to as a substitute for wheat; the spring variety especially is employed for this purpose, in case apprehension is entertained lest the wheat crop prove too small.

In Pennsylvania the reports as to this crop are favorable. In a number of counties where its product is proportionably the greatest the increase in that of 1847 over that of 1845, is estimated at 10, up to 20 or 25 per cent. In some instances it is stated, however, that it is raised mainly for the sake of the straw as litter. The average yield is about 15 bushels on the whole aggregate, though in instances 25 or more are mentioned.

In the state of New York we should judge the average per acre may have been larger, but in many sections of this state little or none is raised. The same is the case with the New England states, where, however, it is oftener used as a breadstuff. In Connecticut the amount produced, compared with wheat and the other grains, is large. In that state we believe the crop this year was better than the average one, and probably an advance upon that of 1845. The report respecting it in Maine, is less favorable, and it seems to have suffered from being winter-killed in the more northern parts of the state. As a whole, however, it was a small increase for the two past years.

The rye crop in New Jersey partook much of that of the states adjoining. It is believed from the best information obtained respecting it, to have been equal and probably better to the acre than the crop of 1845, though other causes may have prevented any additional breadth of land being appropriated to it.

Virginia raises a small proportionate crop of rye as compared with wheat, and two-thirds of the whole amount produced in this state is from the western district. In the eastern section of the state for some years past the rye crop has failed and thus but little has been sown. In the western district while in some counties the amount seems to have been lessened, yet in others there was an advance it is believed of from 10 to 20 per cent. Taking the whole aggregate product of the state it is estimated to have been better than in the year 1845. In Kentucky, Ohio, and the other western states, though in some instances it is reported to have decreased, yet on the whole there was probably a small gain. In Indiana the rye crop of a few counties is considered to have been twice as great as in 1845. The general average per acre at the west, according to the answers we have received, would seem to be about 15 bushels. Instances are mentioned even as high as fifty and again others as low as 6 to 10. The most frequent however is from 15 to 20 bushels per acre. In parts of Michigan the accounts represent the appearance of the rye crop to have been unfavorable, and in some cases it was nearly destroyed. In others it was on the whole more favorable, and taking into view the growth of the state we may allow a small advance. The attention however is so much turned to the wheat crop, that it attracts but little notice. The inorganic constituents of rye are thus given:

	Seed.			Straw
	Will and Fresenius.	Bichon.	Gerethewohl.	Will and Fresenius.
Potash,	31.89	14.43	30.36	17.03
Soda,	4.33	18.89		
Lime,	2.84	7.05	3.06	8.98
Magnesia,	9.86		11.33	2.39
Phosphoric acid,	46.03	51.81	45.39	3.80
Silica,	0.17	0.69	4.29	63.89

BUCKWHEAT.

In those states where buckwheat is most raised, the failure of the wheat crop in some instances led the farmers to resort to this grain to supply the deficiency. In consequence of this, there was more raised than there would otherwise have been. In the two states of New York and Pennsylvania where more than one-half of the whole buckwheat crop is produced, this was especially the case. In both of these it is believed that there was a considerable advance on the crop of 1845. The average amount per acre is variously estimated at from 15 to 25 bushels. In a few instances we notice in the reports we have received respecting this product, a falling off; but generally it is stated to have been a better crop than that of 1845, by from 20 to 50 per cent. The quality was likewise good, and in this respect it was superior to the former one.

In the New England states, it is believed there is somewhat more attention directed to the cultivation of buckwheat than formerly, and with few exceptions, it would seem to have been quite successful.

The estimate for some of the southern states has been so difficult, and the quantity so small, that it has been omitted in the column. We have thought best, however, to restore in our estimate at this time, the states of Virginia and North Carolina, which were undesignedly included among the omitted ones, and we have based our calculations for these on the estimate given in 1843—making due allowance for the aspect of the crops of this grain in the subsequent years.

The buckwheat crop in the western states we judge to have also been an increased one. In some instances in Ohio and Indiana, the gain is represented as very large, two or three times as much as the usual crop, and often from 25 to 50 per cent. The reason assigned is the aspect of the wheat crop early in the season. In a few instances only have we noticed among our information, any intimations of a decline in quantity, while the quality is pronounced to have been superior. The demand is stated also to have been increasing for some years, and this has turned the attention of farmers towards it. The number of bushels per acre is variously stated from 25 and 30 up to 50. It appears therefore, that the average product per acre on the amount sown, must have been greater than in the Atlantic states. Taking the aggregate in all the states, we believe therefore the increase on this crop since 1845 has been about 15 per cent. There is besides no doubt considerable buckwheat sown which is never harvested, but turned in upon the land to serve as manure, or top-dressing to other crops. Many farmers find their advantage in this application of its growth.

Its use as a breadstuff is confined principally to the cakes which are made of it.

In one of the English Journals we find a communication by Dr. Stein, describing the Russian mode of using buckwheat, which is as follows:

After the grain has been divested of the hull, and broken much like hominy by being passed through a mill, a portion of it is placed in a common earthen vessel, so as to fill it about two-thirds full. Upon this is poured fresh water so as nearly to fill up the vessel, which is set in an oven heated enough to boil the water slowly. This is continued till the water has evaporated, and the grain begins to dry; then lessen the heat of the oven; the grain is thus swollen and rises to the top of the vessel and forms a thick brown crust over its edges. It then begins to crack, which shews that it is ready for use. For this purpose cover the top of the vessel with a dish and place it on the table. On breaking the crust and adding butter and salt, mix in the crust with the swelled grain, and it will form, it is said a very nutritious and agreeable food. It is used constantly by the peasantry of Russia, and is most highly esteemed by them.

According to an analysis of this grain, by Dr. Hodges, the bran of buckwheat, apparently so dry and innutritious, contains of muscle-forming materials as much as the average samples of rice, and, in his opinion, if it agreed with the digestive organs of cattle it would be good food for them.

MAIZE OR INDIAN CORN.

With scarcely an exception, the accounts respecting this crop, in all the states, are most favorable. The amount raised in 1847, is believed to be unexampled in the history of this product in our country. The increasing demand for it, together with the anticipated loss on the wheat crop induced the planting of a much larger breadth of land. Though the cold and backward spring rendered the planting season a week or two later, yet the months of June, August and July were most favorable to the progress of its growth, and all will recollect how in almost every part of our widely extended country, the information which was circulated respecting the corn crop, spoke of its prospect of an abundant yield. That prospect has been fully realized. The frosts of September even held off, in most cases, till the grain had obtained its maturity, and thus was out of the reach of danger.

Although this is a crop which is universally produced to some extent in our country, yet owing to the great similarity of its appearance the past season, it will not be necessary to go into particulars very extensively. Our information respecting it through its whole period of growth, from the planting to the gathering, is more full than with respect to most others, as it fell more under the observation of our correspondents in general.

New England raises a fair proportion of corn, as compared with other products of the earth. Probably nearly the whole of it is consumed at home. The varieties which are most favorable for the northern climate of these states, are the yellow as distinguished from the southern white kinds. They contain more oil and gluten, but less farinaceous properties than the latter.

The information from Maine represents the increase of this crop for 1847 over that of 1845, to have generally been from 25 to 50 per cent. and in the northern county of Piscatiquis, some estimates place it as high as double. The season is considered to have been far more favorable.

In New Hampshire, where a similar increase of a quarter at least is supposed, the prospect of new rail roads is also supposed to have exerted considerable influence in some parts of the state. The increase of laborers to be sustained while the works were going on, and the additional facilities of markets furnished when completed, are thought to be the result of these improvements; and thus their action on the increase of this crop may be accounted for. In the other states of New England also, the advance on the crop of 1845, is variously estimated from 20 up to 25 per cent. and the average amount of a good crop is set down in New England as from 25 up to 50 bushels, though much larger ones are sometimes raised. Premium crops indeed, in favorable locations and attended to with more than ordinary care often reach to 75 or 80, and sometimes 100 bushels per acre.

The state of New York is a large producer of corn, though comparatively it does not hold the rank in this state that wheat does. The general account of this crop in all parts of the state is good. There is perhaps an exception or two in which it is thought to have been less, and the reason assigned may be regarded as a somewhat singular one, that too much was planted for good culture. The average estimates in different parts of the state are one-quarter to one-half more, and it is mentioned usually that more was planted. The eight and twelve rowed yellow seem to be the favorite varieties in most cases. The average product of a good yield is given at from forty up to sixty, though the common one is probably about twenty-five bushels per acre. Similar also is the information from New Jersey. There was a decided increase in the number of acres planted and the product was excellent.

We have not noticed a single unfavorable report respecting the corn crop of Pennsylvania. In all parts of the state it seems to have been abundant. The estimated increase varies generally from one-third up to 40, 50 and even 100 per cent. In the fine county of Lancaster, sometimes called the garden of the state, it is said that there was one-third more than was ever raised, as probably one-third more ground was planted, and the increase was 10 per cent. more per acre. In many instances sixty bushels were raised to the acre, where ordinarily not more than twenty-five or thirty are raised. The moist weather in August as well as the favorable season previous, are likewise mentioned as causes of the increase in the western parts of the state. In some cases in Maryland, the corn crop is represented as being short, and that there is an unusual amount of damaged grain. We suspect however, this is local, and if we may judge from the early appearance of the crop, and of its progress through the seasons of growth, as well as from what we learn respecting it since it has been gathered, we believe that a considerable increase must be allowed. The crop of 1845 was not a good one, being considerably less than that of the preceding year. We have also traced back the former history of this product, and have been led to correct some of the preceding estimates which will give a larger quantity for this year, than the mere per centage might allow.

In Virginia, and more especially the western part of it, the increase of the corn crop over that of 1845, appears to have been large. In some instances it is rated as double, in others one-half more. In the eastern section, the increase is supposed to have been not so large, but as varying from ten up to twenty, twenty-five per cent., or one-third more.

It will be recollected that we allowed a decrease of about thirty per cent. in 1845, on the aggregate corn crop of Virginia; although that year was in many respects unfavorable, yet on reviewing and comparing the estimates with the census returns, &c., we are now inclined to place the decrease for that year somewhat lower, and this consideration must be regarded as influencing the increased amount of 1847.

In North Carolina, South Carolina, Georgia and Alabama, the corn crop of 1845 suffered extremely from the unusual drought. The crops of the year 1847 on the contrary, have been far better than usual. In some instances in South Carolina it is thought to have been thrice or four times greater; the greatest crop ever raised—while that of 1845 was the smallest. In others it is supposed to have reached to fifty or seventy per cent. The most general estimate, however, in all these states is about one-third increase over that of 1845. The average acreable product, is given from twenty up to thirty-five bushels in these states, although it reaches sometimes to forty and fifty bushels. The average of the aggregate crop of the state might not reach higher than twenty-five or thirty bushels.

Louisiana raises a very good crop of corn for home consumption, though not equal indeed to that of Mississippi or Arkansas. In these states likewise the statements respecting this crop lead us to believe there has been an increased crop, ranging from 20 per cent. up to one-third more than the crop of 1845.

The crop of Mississippi for 1845 has been corrected, which increases the estimate. The white gourd seed varieties are mentioned in the foregoing states as the favorite ones produced. They are better adapted to the warm climate which there prevails, as well as for the purposes to which they are applied of hominy and for bread stuff.

Tennessee, as appears from the returns of the census, and as we think too, the history of the corn crop shows, stands foremost in the amount of this grain produced. The estimate of 1845 may perhaps have been too large, but there has been some advance on the crop of that year, not so large it would seem by the reports we have received as in some of the other states.

In Kentucky the fine season is stated to have been favorable to the crop. The increase above that of 1845 is variously estimated at from fifteen up to thirty per cent. The acreable product is given at about thirty to forty bushels. Ohio produces a heavy corn crop, and the account of the success of the product of the earth for 1847 is very favorable. With but few exceptions there is reported an increase, varying from ten, twenty-five and thirty-five up to fifty per cent. In some instances owing to the increase of population, it is stated to have been probably double or three times as large. Where any decline is noticed, the dry season is given as the cause. The acreable product is generally given as forty bushels. The varieties raised are the yellow gourd, the common yellow, the red blaze gourd seed, &c.

Similar favorable accounts represents the crop of Indiana, Illinois and Missouri as generally very large. While there is now and then an instance of failure, yet it is most commonly stated that much more was planted and the yield excellent; one-third, one-half more is not an unusual estimate, as compared with the crop of 1845. In a few instances, two, three or four times more is believed to have been the result.

The failure of the wheat crop and the increased consumption, from the increase of population, combined with the foreign exportation, created a large demand, and led to much more being planted, while the toil of the husbandman in this respect was greatly blessed. The white flint and yellow seem to be favorite varieties in these states. The acreable amount as given varies from forty to fifty bushel in many instances; in others it does not reach higher than twenty to thirty. Large crops however are sometimes raised, exceeding one hundred bushels.

The crops of Wisconsin and Iowa seem to have suffered somewhat from the cold and backward season, but as a whole there has been a decided increase, and in some instances it is estimated as high as one hundred per cent.

The acreable product as given varies from thirty to forty and up to sixty-five bushels per acre.

In Michigan there was more corn planted than in 1845, and the product was much larger. The average product per acre is estimated as being forty or fifty bushels in many parts, and the whole increase as not less than forty or fifty up to one hundred per cent.

It will be seen from this rapid sketch, and we might, had it been necessary, have gone further into particulars, that our large estimate of the corn crop seems to be fully justified. In numerous cases we have seen estimates, apparently on good authority setting down 50,100, and even more acres, at fifty bushels up to seventy-five or more per acres. In one case which is mentioned in the Ohio Statesman, a field of forty acres is stated as likely to average one hundred bushels to the acre.

We have not noticed much complaint, the past season, with respect to the various *insects* which injure maize or Indian corn, and the *diseases* which sometimes affect this valuable crop, appear to have been much less prevalent. A peculiar disease, however, is mentioned in a part of Maryland, which may deserve some notice. It is attributed to the drought in the early part of the season, and the rains which succeeded in August. The appearance of the corn is thus described by Dr. Muse: "The cap of the injured ear is discolored, and when opened a few grains near the apex of the ear, and one side of it, mark the commencement of the disease in their sickly and shrivelled appearance; this increases in *space* and *intensity* until the whole ear exhibits a deadly and gangreneous mass of black rotten grains, while the whole plant on which it grows is erect, and of the most healthy and vigorous appearance." He accounts for it from the want of solar influence necessary to assist the vital activity of the plant to elaborate the juices, to decompose the carbonic acid; to fix its carbon, and to release and restore to the atmosphere the oxygen. Whatever may be thought of the doctor's theory to account for the evil, it deserves consideration, as it seems to have done much damage to this important crop in the vicinity of his residence.

The estimate we have given of the corn crop may not correspond with that which may be formed by some. We have seen it placed as high as 600,000,000 of bushels, and again lower than our number. Some allowance must be made in comparing estimates for the time they are made. It has been stated, on good authority, that a bushel of corn from the time of its being harvested till it is thoroughly dry, will shrink 22 per cent. Hence we must deduct from the earlier statement of crops about one-fifth. This may account for the fact that the amount of export does not exhibit the true proportion of the crop gathered.

We prefer to fall below the real amount than to exceed it in our estimates.

Besides that which is gathered in its grain, there is also a very considerable quantity which is destroyed by soiling; not being suffered to come to the seed, or if so, not harvested. This practice prevails, probably, more at the south and west than in other portions of our country, but the fact deserves notice when adverting to the various products which constitute our agricultural resources for the use of man and beast.

We have mentioned some of the *varieties* which are favorites in the different sections of the country. The tree corn is highly recommended by some, to be sown broad cast for fodder; it is said to be sweeter, not liable to mildew, and, in some of our northern states, it is said to be worth 25 per cent. more when planted in the same soil and under the same circumstances. Originally it ripened about a fortnight later than the white and yellow flint, but by the selection of the earliest ears, we are informed that in Connecticut, it is only a few days or a week at most behind the others. It is said to have succeeded well, also, as far as 40° north, and is highly praised in a Tennessee journal as out-yielding most varieties, and making the best and sweetest meal, while by the abundance of the leaves it will give the greatest quantity of fodder and the best quality of any known.

One of the best of the northern varieties is a kind called the Brown corn, from the name of a successful cultivator on the shores of lake Winnepiseogee, in New Hampshire. It grows but five feet high, produces two or three ears on a stalk, with very large kernels, and may be planted in hills only three feet apart. It is said that in New Hampshire 135 bushels of shelled corn to the acre have been obtained from it, and on an average, it has been stated by a good judge of the subject, it might reach ninety or more. In the vicinity of the Hudson river it is said to ripen early, by the middle of August; the stalks are small and the ears near the ground, and it is not so much affected by the shade as other varieties, which renders it a useful variety for planting orchards. Five ears of this variety, about ten inches long, when shelled, produced one quart of corn, containing 2,000 grains, equal to 64,000 grains for a bushel.

The advantages which this kind of corn possesses over many other varieties, have been stated to be,

1. The greater yield with the same culture.
2. From its rapid growth and early maturity, it is secured both against the late spring or early autumnal frosts, and may be early brought into use, or to the market.
3. As it is very hard and oily, it is excellent for shipping.
4. The small size of the stalks renders it less exhausting to the soil, less liable to be blown down in high winds, and it may be planted nearer together.

The following table which we take from the American Agriculturist, was constructed with reference to the Brown corn, but may, probably, answer for other varieties, which have grains of about the same size. It is for an acre of land with the hills at different distances.

Distances of the hills apart.	Quantity required, 4 grains to a hill.	Quantity required, 5 grains to a hill.
	qts.	qts.
3 feet by 2 feet,	14.52	18.15
3 " 3 "	9.68	12.10
3½ " 3 "	8.30	10.37
3½ " 3½ "	7.11	8.89
4 " 3 "	7.26	9.08
4 " 3½ "	6.22	7.78
4 " 4 "	5.44	6.80

The kinds of corn called the Oregon and the Baden, which were formerly distributed from this office, seem to have answered well. Dr. Muse of Maryland, well known to the agriculturists of this part of our country, speaking of the Oregon, which he received from this office, says, I have grown it and have a high opinion of it; it is a yellow corn, and has a deep grain, and I think it will shell out very heavily. Of the Baden, he says, it has been my favorite corn for many years, as the most productive and most heavy of any kind I have ever tried There are different varieties which pass under the name. His reference is to the pure white Baden. Some of the others tried by him proved to be very inferior.

An interesting experiment, in which a fine variety was secured, by blending two or three dissimilar ones, is mentioned in the Columbia Advocate of South Carolina. The corn produced is stated to have measured, in some cases, from twelve to thirteen inches in circumference, and from twelve to fourteen inches in length, having from forty to forty-eight rows of grain in an ear. This was, however, the yield of a single ear to a stalk; the ears which were from stalks bearing five or six ears or more were smaller, though it is said as many as three of the ears, even of those stalks would *each* measure, when shelled, nearly twice as much as the largest ear of the common corn. It was mostly of the white gourd seed, but the varieties from which selection had been made are thus described: The one was remarkable only for a grain an inch deep, or a cob the size of the finger; another, for its thickness of cob but extremely short, and another still for the length of the cob, but extremely slender, &c. Either of these varieties, regarded singly or separately as to its properties, would have been considered hardly worth the planting. By attention, and suitably blending these varieties, he obtained the valuable one which has been mentioned above, and which might be truly called a mammoth corn. The ground on which it was raised is described as being an exhausted plantation near Monticello, on the red hills of Little river, but the mode of cultivation is not given.

Many instances might be mentioned of the uncommon *size* of single ears or large crops of corn. A few, however, will be all that we shall quote to shew the capabilities of this most valuable grain.

The editor of the Ohio Cultivator mentions a part of a seed ear which weighed two pounds, was twelve inches in length, nearly ten inches in circumference, the number of grains, 1,446, three-fourths of an inch in length, and the corn on the ear measured above a quart when shelled. It is of a kind which requires to be planted early, about middle of April, in Ohio, for a good crop. Another ear, raised by another gentleman, and of a different variety, as it would seem, is mentioned as being sixteen inches in length, containing 1,006 grains. A specimen of Indian corn also was exhibited at an agricultural show, having twelve ears on one stalk. The same journal mentions a crop, raised in Scioto county, of one hundred and sixty bushels of corn on an acre of land. It is presumed, that this of course, means ears before being shelled.

The growth of corn, during a part of the last summer, was most rapid; and we notice some statements respecting it which may be interesting in this connection. In Massachusetts, a person in Amherst is stated to have noted the growth of a single stalk, during three days, as follows: first day, six inches, second, five and a half, the third, five—total, sixteen and a half inches in three days. In a Rochester journal it is said, that on observing, for many days, in July, the progress of corn, five inches was the maximum for twenty-four hours. Contrary to the common idea, that plants do not grow except in the light of day, the observer found, that both corn and grape vine increased quite as fast from 8, P. M. to 4, A. M., as during any portion of the sixteen hours from 4, A. M. to 8, P. M.

If our space allowed, we could fill pages with interesting facts relating to the exhibitions of this vegetable product. We refer to our appendix, No. 3, for some things relating to the culture, &c., of corn. A translation, with respect to maize in Mexico, and the method of making the tortillas, which are so frequently mentioned in the public journals, may likewise be found in the appendix, No. 4.

The mode of preparing the Italian polenta or maize flour, as practised in Italy, is thus given in a communication from Florence to the London Gardeners' Chronicle.

Take polenta, perfectly dry and fresh, moistened with boiling water and perfectly mixed by stirring with a wooden spoon until the mass is reduced to a thorough paste, of consistence to admit of boiling. Steep it just below a boiling temperature, until by tasting it is found to be perfectly homogenous—about ten minutes suffice, stirring it the whole time. Remove it from the fire, and add as much fresh butter, strong brown gravy, grated Parmesan cheese, &c., as suits the palate—grated ham is likewise excellent. Simmer it ten minutes, stirring it the whole time, then pour the whole mass into a well buttered mould and serve it up with brown gravy. Another mode of using the polenta is the following: Stir in hot water and simmer till of a consistence which just allows it to run from the pan. Pour the mass on a board, and when cold cut it into diamonds an inch square.

The thickness of the paste should not exceed three-eights or half an inch. Put the squares close to each other in a dish, but they should not touch. Pile layer above layer, a little butter, and grated cheese between each; or if it is to be eaten as a pudding, pounded cinnamon, sugar or molasses. The butter, cheese or sugar, prevent the bits or layers from sticking to each other. Brown the whole over by fire, above and below, or bake in an oven, or steam until the cheese be softened or the butter and sugar be incorporated in the paste. This latter dish is called *polenta gnocchi*; the former one bears the name of *timballe de polenta a la savoyarde*, and are said to be famous popular dishes in Italy; so general, indeed, is the former as to have given rise to the proverb, *ognum puo della sua pasta gnocchi*,—every one may make gnocchi of his own paste, i. e. any body may do what he likes with his own, which is considered a very suitable method of rebuke to the officiousness of those who meddle with other person's affairs.

The effect of *plucking the leaves* of corn, for fodder, on the productiveness of the ear, is a subject which is of practical importance to our farmers.

The following is stated to have been the result of an experiment, tried by a gentleman in South Carolina, for the purpose of ascertaining the loss. He selected twelve rows, as nearly equal in appearance as could be found. Of these, Nos. 1, 4, 7, 10, were left with the blades on until they were generally dry to the ear, and on some stalks, even to the top; they were then cut up at the roots and shocked on the field till the other corn was gathered in; they were then hauled in and shocked from the stalk; Nos. 2, 5, 8, 11, were left with the blades on; Nos. 3, 6, 9 and 12, were stripped of their blades as late as usual. The result was as follows:

Nos. 1, 4, 7 and 10, when shelled, measured four pecks, one gallon, two quarts and one pint, and weighed 70 and a half lbs.

Nos. 2, 5, 8 and 11, measured four pecks, one gallon, two quarts and one and a half pint, and weighed 71 and a half lbs.

Nos. 3, 6, 9 and 12, measured four pecks, half pint, and weighed 55 lbs.

The fodder taken off from the last was also carefully weighed and amounted to 18 lbs.; which, added to that from which it was taken, is 73 lbs., only one pound and a half more than the corn alone from which no blades were taken, and two and a half pounds more than that cut up by the roots. It would seem, from this experiment, therefore, that the practice of pulling off the leaves for fodder is injurious, as it deprives the corn of nearly the weight of the fodder, when cured, without reckoning the time also consumed in taking them off.

Maize has never been analyzed with sufficient accuracy. It is not surprising that it should have been passed over abroad where it is less known. But it is remarkable that so favorite an article of food as it is in our own country and so useful a product for various purposes, it should have been thus neglected. The varieties are so numerous, and their characteristics so different that it is true the analysis of a northern corn would not serve for a southern one and vice versa, but the two great species might be analyzed with more minuteness and care than have yet been given to them. It will be recollected that in Dr. Jackson's report on the geology of New Hampshire, which was quoted in a former report, the constituents of this grain were pointed out in connexion with other products, and the fact stated that Dr. Jackson found the great difference between the grain of the northern climates and those of the southern to be the unequal proportions o[illegible]ten and albumen. The white corn of the south is most albuminous [illegible]lds more starch flour, while the yellow hard corn of the north is more oily and possesses more gluten. On this account it has been considered to be the best for shipping, less likely to sour. That evil however, is now cured by kiln-drying.

The inorganic parts of maize or Indian corn is thus given by a [illegible]ter in the London Gardeners' Chronicle:

	Seed Letellier.	Straw	Horshmer.
Potash,	30.8	12.94	4.56
Soda,		38.74	12.41
Phosphoric acid,	50.1	10.52	21.40
Carbonic acid,		9.49	4.37

The value of maize or Indian corn has been heightened by the introduction of it into Great Britain. Although not at once securing universal approbation, there is reason to believe, that when more pains is taken to prepare it for a foreign market and it is eaten there in its best state, it will more and more gain favor.

To effect so desirable an object, the best modes of kiln-drying are necessary. Various inventions have been made for this purpose, some of which appear to be very successful, and by which the business is carried on on a large scale.

The following simple expedient has been published as from good authority, and has moreover been attested as likewise applicable to rye. It was communicated to the New York Farmers' Club, by a gentleman who had been for twenty-five years in the ship store business. He says that he formerly found much difficulty in furnishing corn meal that would keep sweet on long voyages, and in warm climates. On mentioning the difficulty to Zenas Coffin, Esq. one of the oldest whalemen of Nantucket, he was informed by him that there was no difficulty in keeping corn meal sweet for a three years' voyage, by putting a beach stone, the size of a large paving stone, in the centre of a hogshead of meal and hooped tight, and for a barrel, a stone four or five inches in diameter and made tight. Experiments were then made in regard to meal to Rio Grande and other southern ports, by sending the meal with the stone and also without the stone, and on the return of the ship, it was found that the meal with the stone in the centre of the cask kept sweet, while the meal without it was spoiled—*sour*. It is necessary to have the cask water-tight. The same gentleman likewise stated that corn meal in tight rum puncheons when sent to the West Indies will keep sweet, while in a common flour barrel it will spoil.

We have received no particular information relating to *broom corn*, but it is believed that increased attention is paid to its cultivation and manufacture, which appears to be very profitable in some parts of our country.

This plant is of a different genus from the maize and is said to be a native of India; the popular error that they will mix is denied very emphatically by high authority. An interesting account of its cultivation on the Mohawk flats is given in the Cultivator. The persons engaged in it are said to have two hundred acres of land devoted to it. The seed is sown by a barrow or drill as early in spring as the ground will admit, in rows about three and a half feet apart. As soon as it is above ground it is hoed, and soon after thinned, so as to have the stalks two or three inches apart. It is only hoed in the row, to remove the weeds near the plants; the harrow and cultivator is then run through to keep down the weeds, and a small double mould board plough is likewise run shallow between the rows. It is not left to ripen but cut green. Instead of lopping down the tops of the corn and letting them hang sometime to straighten the "brush" in one direction, it is not lopped till ready to cut. One set of hands goes forward and lops or bends the tops on one side, and another follows, and cuts them off when bent, a third gathers them into carts or wagons. At the factory they are sorted over and put into bunches, each bunch of brush of equal length. The seed is then taken off by a sort of hatchet, worked by six horses which cleares the brush very rapidly. It is then spread thin to dry on racks in the building, for the purpose. In about a week it can be packed away closely. The quantity of brooms turned out is said to be one hundred and fifty thousand dozen per annum. They are made in the winter. The stalks are left on the ground, and ploughed in next spring, thus keeping up the fertility of the soil.

The origin of broom corn as a cultivated product of this country, is in Watson's Annals of Philadelphia, attributed to Doctor Franklin. He is said to have accidentally seen an imported whisk of corn in the possession of a lady of Philadelphia, and while examining it as a curiosity, saw a seed which he planted, and from this small beginning has sprung the present product in the United States of this article. We have no means of ascertaining the number of acres devoted to it nor the amount of product in value, but it must be very considerable. It is raised in Ohio, and in some of the New England states as well as in New York and Pennsylvania.

POTATOES.

The time was when this crop was numbered among our most successful ones. Affording as it does, not merely a favorite esculent for the table, but an excellent fodder stuff, tt was a means on which the farmer relied to supply him with sustenance for various animals, with no little confidence. It was likewise assuming a place among our home manufactures for the starch which it afforded. But within a few years there has been a sorrowful change, and throughout almost the whole extent of the country where the common potato is cultivated, instead of ascertaining the amount of the crop, our attention is rather demanded to learn the amount of the loss suffered.

It is only in this way that we can hope to arrive at any reliable conclusions respecting the productiveness of this crop. We have as a data to fall back upon the returns of the census, and the estimates of two or three years subsequent, when, happily, the destroying plague had not appeared. As we shall devote some time to the subject of the disease, we shall only run over the estimates reported to us somewhat rapidly, embodying most of our information under the former branch of the subject.

The loss of this crop falls heavily on the state of Maine and the New England states generally. Maine has been celebrated for her fine potatoes. Her climate or soil, and perhaps both, have seemed peculiarly adapted to this plant. In her prosperous years of cultivation, large quantities have been raised for export, besides what were necessary for the home consumption. This year, however, this source of her commerce and wealth has been greatly cut off, and in some sections hardly enough have been raised for her own population. In some of the instances reported to us, we are told that the crop of 1847 is fifty per cent. less than that of 1845, and ninety per cent. less than that of 1843. The average number of bushels also is estimated at not more than twenty bushels to the acre In some other parts of the state the evil may not have been so severely felt, but the aggregate crop of the state is greatly reduced from the fair average one.

In New Hampshire and Vermont, with the other states of New England, the estimate of the loss varies. Perhaps the amount of loss is not, on the whole, so great in Connecticut as in the other states. In some instances we have understood that very fine potatoes, and of excellent quality, have been raised there. For some reason or other, the more northern sections of the country seem to have suffered most; twenty-five and thirty per cent. decrease from the crop of 1845 are the common estimate, where the amount per acre is set from one hundred to one hundred and eighty bushels.

The loss on the crop of 1847, in the state of New York, is variously estimated. In some counties, from apprehension of the evil, less were planted, while in others, more contiguous to the markets, there was a large extent of ground devoted to this vegetable. The early appearance of the crop, both here and in New England, was most promising. The vines flourished, and the tubers apparently set so as to encourage the hope of the farmer, that his potatoes would escape, and his labors be at last again rewarded. But in the latter part of August they told another tale—the blight came, and the tubers already formed began to decay. In proportion as the quantity planted had been large, was the evil. In some places the loss is estimated at twenty-five, in others thirty, fifty, and up to sixty per cent. At all events, there was in the aggregate a great reduction from an average crop. The acreable product also ranges, according to the estimates furnished, at from thirty up to sixty, eighty and one hundred bushels.

In the potato crop of New Jersey likewise, and Pennsylvania, similar deductions are required. In these states there has been rather more attention recently paid to the sweet potato, in consequence of the evil by which the common potato has been rendered less productive. In the reports from this state, as well as in some others, the crop is estimated as it actually was, and the loss by the rot then given. There would seem to be reason for supposing, that viewed in the light of productiveness simply, there may have been an increase in some parts of the state, but the rot has been very severely felt. The disease appears to have been felt for the first time, this year, in particular portions of this state While the loss is variously estimated, from ten up to fifty per cent., yet we are inclined to believe, in the aggregate it did not cause as great a reduction as in some of the states we have already mentioned.

The potato rot seems likewise to have been felt to a considerable extent among the common potato, when cultivated in Maryland. It has not heretofore prevailed with very great severity in this state, but it has been gradually extending its attacks further to the south and west every year.

In the western parts of Virginia, owing to the scarcity of seed, there were less potatoes planted; the rot also made its appearance, and very considerably lessened the crop. It is thought, however, in some places to have abated. Not a great many are ordinarily raised, and chiefly for table use; they are not resorted to for the food of cattle. The average product per acre is by some estimated at one hundred bushels. The loss is estimated at one-third. Indeed, the general reports from the state represent the crop as seriously affected; though in the eastern counties it is stated that the productiveness was good, but they sustained loss after they had matured. We should judge that the crop of sweet potatoes was a less one than that of 1845, as the drought diminished the amount produced. The sweet potato crop of South Carolina is represented as having been a very fine one, in some instances probably double or three times that of 1845. The general average of the state, per acre, is given at about fifty bushels, though in the vicinity of Charleston it is said to be one hundred, and in other districts one hundred and fifty bushels per acre. The Irish potato, where raised, likewise were fine.

The advices received as to the sweet potato crop in Georgia and Alabama and other states, are likewise favorable; twenty-five per cent., one-third, one-half, are mentioned as the probable gain on the crop of potatoes for 1845. The season promoted their growth, and the average product, in different places varied from fifty up to one hundred and fifty or two hundred bushels per acre. The common potato is occasionally used, and no complaint is made as to its success this year. In Louisiana it is planted in January.

In Tennessee and Kentucky the potato crop is given as varying from ten to twenty and twenty-five per cent. better than that of 1845. Both kinds of potatoes are raised here, so that it is difficult to discriminate. No mention, however, is made of the rot; the average product per acre is given as from fifty to one hundred and two hundred bushels.

The Ohio potato crop suffered in particular sections of the state, to some considerable extent. The evil, however, was less in others, and instances are mentioned of a decided increase. The sweet potato is raised here, but chiefly however the common or Irish kind.

The loss does not appear to have been so great in Indiana, Illinois and Missouri as in Ohio, and the states from the east; in some sections it is estimated at a loss from the rot, of 10 to 25 per cent. In others there was an evident gain, and there may have been so in the whole aggregate crop. The disease was felt somewhat this year in Michigan, Wisconsin and Iowa, but the report on the whole is judged a favorable one.

It will be recollected that there was a great falling off of the crop in 1845, so that taking this as the basis of comparison for the present year, we must probably reckon it considerably under the average crop. Regarding the entire crop of the United States, we doubt whether the Irish potato crop will reach to the returns of the census, although there has evidently been an increasing cultivation from other causes. The sweet potato crop we believe may have gained on that of the census; and taking both together we believe that it is above the crop of 1845, but not equal to the census returns.

In Appendix No. 5, we have subjoined some papers relating to the *cultivation* of potatoes, &c. The failure of the crop, and its great importance, has led to a variety of investigations respecting its nutritiousness, and its elementary principles, and many most interesting results have followed the experiments which have been made for this purpose. According to Dr. Dobereiner, the following is the *chemical composition* of potatoes obtained from the seed.

	Potatoes from Albert.	From Krause.	From Greger.
Water	714.4	756.2	810.9
Starch	115.9	110.5	107.0
Fibrine	70.9	52.5	50.0
Substances soluble in water	98.8	80.8	32.1
	1000.0	1000.0	1000.0

The following analysis by Dobereiner, is given of a large sort grown in the year 1845.

Water	740.9
Starch	120.0
Fibrine	48.9
Albumen Gum	90.2
	1000 0

The most important elements may be seen in the following comparison:—

Substances.	Potatoes from tubers according to Einhoff, Henry and Lampadius.	Potatoes from seed by Dobereiner.
Starch	15 per cent.	11 1 per cent.
Fibrine	7 " "	5.7 " "
Water	73 " "	75.0 " "
Gum	4	7.2 " "
Albumen	1	

Of the remaining elements Henry, in his researches, gives 3.3 of sugar, and 0.1 of fat. Vauquelin 0.1 of asparagin, a highly azotized substance found in asparagus, 1.2 of citrate of lime, and an undetermined quantity of pure citric acid, citrate and phosphate of potassa, and phosphate of lime; and according to the quantity, these substances determine the greater or less value of the potato. In addition to these, Buchan, Ba[illegible], and Otto, have pointed out the solauin, a poisonous substance found in the potato, and which is said to be the cause of the paralysis which comes upon the extremities of animals that have been fed on potatoes which have been used by the distillers.

The following is stated to contain the result of the examination of potatoes at various seasons of the year:

240 lbs. of Potatoes contain of Starch:—

	lbs. lbs.			
In August	23—25	or	9.6	10.4 per cent.
September	32—38	or	13.3	16.0. " "
October	22—40	or	13.3	16.0 " "
November	38—45	or	16.0	18.7 " "
April	38—28	or	16.0	11.6 " "
May	28—20	or	11.6	8.3 " "

It would therefore appear, says the author from whom we quote the above, that potatoes ought to be protected from frost, heat, and germination.

The following table shows, according to Payen, that starch and water always exist in inverse proportion; where there is most starch there is least water, and vice versa. Starch and water will be found to constitute from 91.7 to 92 per cent. of the mass of all potatoes.

	Starch.	Water.
Rohan Potatoes	16.6	75.2
Large Yellow, do.	23.3	68.7
Scotch	22.0	69.8
Irish	12.3	79.4
Luganzak	20.5	71.2
Siberian	14.0	77.8
Duvilliers	13.6.	78.3

We have heretofore mentioned the application of the potato to the *manufacture of starch* in Maine. The following account mentions a large manufactory of this article in Michigan, at Almont, Lapeer county. It is probably the largest establishment of the kind in the United States, and is owned by a gentleman who is also interested, it is said, in two others in Vermont We quote from the Detroit Free Press.

"The factory is 214 feet long and 40 wide, including an L. The main building is 134 feet long, 14 of which are used for an engine room, and is two stories high. The lower part has 64 tubs, holding about 600 gallons each, giving a total of 28,400 gallons. The L part is 80 feet long by 40, of brick, one and a half stories high, for a potato bin. Loaded teams drive up a platform into the second story, and following a circle, 13 teams can unload at a time, through trap doors over the bin, which is calculated to hold 40,000 bushels. One hundred and thirty loads have been received in a day, making a total of 4000 bushels.

In the second story of the principal building is an oven 100 feet long by 18 wide, for drying the starch: or rather, I should say, an oven of 200 feet by 9, as there is a division in the centre, with doors some ten feet apart. In the oven there are sets of pans, one above the other, which can be turned at pleasure. It is heated from the steam works, and conductors of heat are carried in tin pipes all over the building.

The potatoes are shoveled from the bin into a hopper, where there is water constantly running into it, and where they are as thoroughly washed by machinery as a cook could do it for your dinner. Then, by the action of the machinery, they are separated from the dirt, stones, and sticks, and pass on to two cylinder graters, at the rate of 100 bushels an hour. From the graters, by the action of the machinery, they go into the seive, that separates the starch from the potato. The pulp then passes into four large cisterns, and there again machinery pumps it into the 64 large tubs or cisterns, before alluded to, for settling. Then the water is drawn off and the starch, by a forcing pump, is carried into the second story, and, when settled, put into the oven I have before spoken of, which is calculated to bake a day's work, being the starch from 1000 bushels or 60,000 lbs. of potatoes. The starch is packed in casks and shipped east. The cost of the factory is $12,000.

Considerable starch was made last season, (1846,) but the rotting of some 30,000 bushels last fall curtailed the quantity anticipated. This large quantity of the raw material was thrown away. It served to feed many cattle and hogs of the neighborhood for some months. The pulp remaining as worthless, is used in fattening hogs, which the proprietor has in a yard adjoining.

The factory price for potatoes is ten cents a bushel. Mr. C. has contracted with various farmers to the amount of 400 acres. The average number of bushels raised last year on an acre, was 275. Allowing the same this year, it will amount to over 100,000 bushels; but this is not half the quantity wanted. Farmers are unwilling to contract, fearing the rot. Present indications are good for the crop. All varieties are used—even the Rohan.

It takes the fall and winter to use up the potatoes; then wheat and corn are used for the same purpose. The quantity made from the potato per year will not be far from 1,000,000 lbs. or 500 tons. It sells for $5 a hundred in New York."

An interesting fact is stated in the Pharmaceutical Journal, which seems to prove the great *indestructability of starch* in potatoes:

"A gentleman in 1841 (four years before the time of the account given) made a pit and filled it with potatoes; but the potatoes, when winter set in, were so far decayed as to be considered worthless. He accordingly buried them in the ground three feet deep to rot and turn to manure. On digging over the spot four years afterwards, a white mass was turned up, which proved to be part of the remains of the potatoes. On examination, the original layer of two feet deep was found to be compressed into one of eight or nine inches. The upper part of it consisted of a mass of white powder, which, on being examined with the microscope, was ascertained to be pure and perfect starch. In the lower part, the skin part of the tubers, as well as the starch, still remained, and each potato could be separated from the rest like a dried fig; and on removing the dry peel, the interior was found to consist of starch nearly pure. These remains of the potatoes had a strong and most offensive smell, but the starch, on being washed, was as sweet and white, and in all respects as good as that from sound and fresh potatoes, though buried in contact with the decaying tubers full three years and a half. The surface of the decayed potatoes was covered with an immense number of earth worms completely matted together, and the mould for six or eight inches above them was full of maggots similar to common house flies; but neither worms nor maggots were found among the decayed potatoes."

POTATO ROT.

Since our report of 1845, which contained many pages in reference to this evil, renewed attempts have been made to discover, if possible, the cause, and to devise a remedy. Numerous experiments have been tried and the disease has been investigated in almost every possible shape and form. Theories have been propounded and renounced. Vegetable physiology, chemistry, and every kindred science, has lent its aid to trace the monster to his lurking place; but hydra-like, if for a time one head seemed to be destroyed, another would start up, and as yet science and practice have alike been baffled. Men of learning, and the unlearned, are as yet equally at fault.

There has been no lack of hypotheses, and arguments most ingenious and plausible have been framed, but some sturdy fact would spring up from whence perhaps least expected, and at once render the labor bestowed upon them useless. The whole subject has been so thoroughly discussed in every aspect and guise, that it would seem a vain attempt to seek to reach the cause. There are now so many conditions to be met before any view can be regarded as satisfactory—conditions relating to places most remote from each other, and of most diverse climes, requiring almost contradictions to be brought together and reconciled—that it would be a hopeless task to undertake to sustain any theory we have ever seen broached. Advances have unquestionably been made within the last two years; some new light has been thrown upon parts of the subject; points before in doubt have been settled, and a great variety of interesting results have been developed in the course of the investigations which may aid, not only in future examinations or observations of this disease, but also in practical operations in cultivation and the principles of right husbandry. In this respect, therefore, the labor has not all been lost.

We have closely watched the history of its progress, and every treatise or article on the subject, either domestic or foreign—English, French, or German, which we could command, we have examined. A vast number of these, longer or shorter, have been read and references noted, and notwithstanding we have been instructed, and sometimes amused, we have not been satisfied that the end desired has been attained. Still the disease rages, and no skill or learning can certainly prevent or remedy it.

We have neither time nor space for even an abstract, and far less for a condensed survey of opinion and facts, with reference to this most important subject. We doubt, if in the whole history of vegetable production, there has ever been within the same time such an array of talent, and so great pains-taking, brought to bear upon any one of the fruits of the earth, as has been done with respect to this single affection of the potato plant. It has been noticed in its first appearance in the season, and now also for many seasons, and its progress traced down through all its phases. Analyses the most accurate and minute; the keenest microscopic research; the application of every kind of test that human wisdom could suggest, have been resorted to; but if hope has now and then brightened at the seeming aspect of a discovery, the gloomy reality has again forced the confession, we were deceived, and the cause is still wholly hidden from us. Providence may indeed sometime hereafter unfold the mystery, but as yet it seems beyond the human ken to discern it.

We may however derive some advantage from noting facts in relation to it, nor, as we believe, will it be without benefit to the public to gather from some of the best sources, a variety of particulars more or less connected with the history of its progress. There has never been we believe so universal, destructive and continued a loss of any substance employed as food. Its limits reach according to the accounts, from Australia in the eastern hemisphere to the West Indies, South America, and our own country in the western. The sustenance of millions has been as it were poisoned—famine and disease and death have followed in the train of the plague, that has swept like a blast over continents. Men's hearts have quailed and sunk within them at the cry of the starving who have pointed to fields yielding but sickening masses of putrefaction, and imploringly begged for something that might still the cravings of a raging appetite—humanity has wept to see the bleeding spirit bared and in anguish, while even the gathered contributions of multitudes, by the necessary subdivision has proved but a pittance by which to eke out a little longer the remnants of a woful life. The potato disease—what words of dread to millions! What ghastly shapes of wretchedness and death start forth to speak of withered hopes and blasted expectations! And the end is not yet.

On a subject then, fraught with such bearings, we may be allowed to dwell a short time at least, to mark some of its phases and connect together in one record a few of its facts gathered here and there from the vast materials at home or abroad.

We are sorry to be obliged to confess it, but the speculations of many otherwise well informed in our country, are wholly deficient in that research and patient investigation which give so high a value to not a few of the treatises sent out by men of science and practical knowledge in Europe. These latter are often admirably illustrated, and so far as lies within the range of their powers leave hardly any thing to be desired. Mechanical analysis, aided by a powerful microscope it would seem could go no further. The vegetable structure in its minutest forms has been laid bare, alike in the sound and in the diseased plant. Many curious questions relating to it have been solved, and whatever apparently exerts the slightest influence has been most carefully noted and reasoned upon.

In our observations respecting this evil, we shall regard it as a great general one. We consider it as an established fact that the disease in our country is in its main characteristics the same as that which has wrought such desolation in Great Britain and parts of Europe. It will be unnecessary therefore to examine it separately in our own country, as our object is to condense some of the most prominent facts and reasonings on the subject which have been published since our last report, in which we brought together a vast mass of statements respecting its appearance both at home and abroad. We shall confine ourselves now principally to the views and statements of men of known science, and draw our materials from works of acknowledged authority. It is unnecessary to mention them by name; suffice it to say, we have collated many volumes and treatises besides journals, and noted the progressive history of the disease from the period at which our last report left it.

We think it is very evident that some cases of loss of the crop have been attributed to this disease which do not properly belong to it. When a great evil prevails which affects any particular crop, it is very natural to attribute to it every thing which may injure that crop. This is the thing uppermost in the mind and having once admitted it as a cause, the person who notices any thing which has a disastrous influence may very readily, without further examination, feel satisfied to impute it to such a cause as the true one. This may perhaps serve to account for some of the anomolies which exist in reference to this disease. At the same time we believe, that the general characteristics of the disease are very decided, and to an accurate observer are ascertained without much difficulty. In the Royal Agricultural Society of England, Dr. Calvert sustains the view with respect to variety of diseases as follows:

There appear to be three or four specifically different diseases to which the popular name "potato disease" is applied, viz:

1. The one to be seen in every potato warehouse, attacking the end of the potato to which the connecting cord is attached and extending along the circumference or outside, the diseased portions remaining dry rather than moist.

2. The one commencing in the internal part of the bulb, which becomes so much hardened on being boiled. The internal disease is indicated first by stains on the skin of the potato, seen more distinctly on its being immersed in water; the tubers are quickly decomposed, become soft, moist, of a dark color, but without disagreeable odor.

3. The disease in which the fetor is exceedingly offensive, the specimens exhibiting both external and internal ravages of the disease.

4. A disease, in which the potato appeared, in the early stages, to be firm and sound, but its substance becomes fluctuating and yields to external pressure as the disease advances. On being broken, the potato, though apparently sound, is found to contain a cavity at its centre filled with a fluid matter, which, on escaping, evolves a most intolerable stench.—In observations it is desirable that the distinct disease be designated.

A writer of authority deserving regard, mentions that the brown spotted disease is distinct from that of the fetid putresence. These spots, he says, are not fungus, but a deposit of earthy matter, believed to be silicia, as they resist the action of the acids, and if the whole tuber had been so, it would have resembled the dry rot of Bavaria in 1830.

The first point on which we propose to cite some facts is the *extent* of the disease.

With reference to geographical limits, it presents some singular results. The area of its operations has been enlarged from year to year. It seems to have made its appearance somewhat in Europe in 1844, possibly in 1843, as it did in the United States. In 1845 it spread over all the northern and middle countries of Europe—Spain, however, was exempt. In Portugal, with one or two exceptions, also, there was scarcely any traces of it. Italy and Sicily, and portions of the south of France, did not suffer. In 1844, it was somewhat different—the south of France, Lombardy, Styria, and Carinthia were visited by the disease. It was also observed in Bermuda, Jamaica, at the Cape of Good Hope, the Island of St. Helena, the Island of Ceylon, and at Australia. It is likewise asserted to have been noticed in Bogota, and not unknown in Peru. With respect to the year 1847, we know less, as the results have not yet reached us. In the cases of Portugal, Cape of Good Hope, and Jamaica, above mentioned, the disease prevailed in regard to potatoes which had been imported from England and America.

There is another fact which deserves notice as to its *extent in respect to the subject* of its attack. It does not seem to have been confined to the potato. If not the same, something extremely similar, and simultaneously affected various bulbous roots, tulips, hyacinths, carrots, onions, tomatoes, and, in Jamaica, the yams and the cocoa. This latter plant is formed of a head with leaves and parts proceeding from it like fingers, and the disease is said to have attacked the head first, the heart of which is converted into a black pulp, and becomes a hollow tube; the leaves then droop and die, and the growth of the fingers or eatable part stops. There may be an error in attributing this result to the same disease, but it seems to be admitted as the same in the London Gardeners' Chronicle, from whence the fact is derived. In respect to the other vegetables, the fact of the evil being of the same general character, seems to be admitted. It would be more satisfactory, however, had there been similar analyses made of these vegetables. The *extent* of the evil, as *regards its intensity,* is likewise worth examining. We have not been able to collect all the statistics on this subject we wished, but one or two facts may give some idea of its magnitude.

The extent of the disease in Holland, in 1845, is stated to have been such that out of fifty hectares, (2,471 acres each,) 42,000 hectares were attacked, and the loss is estimated at three-fourths of the whole crop. In France that year it was less, though some portions suffered severely.

The loss of the crop in Ireland for the same year is supposed to have been 8,500 bushels out of every 26,000 bushels, and so nearly one-half. The land thus occupied, was estimated at 800,000 acres, the produce at 8,400,000 bushels, half of this, after deducting seventy-five per cent. for water, 1,767,000,000 lbs., which is equal to 3,612,900 quarters of corn, (i. e. grain,) or 28,903,200 bushels, at sixty-two lbs. per bushel. In value, the loss in Ireland for 1845 is computed at £3,500,000, or $18,000,000: in England and Wales at £1,500,000, or $7,500,000—making, in the whole, at least $25,500,000.

The evil was far greater in 1846, and is estimated, on the same authority, at 8,000,000 quarters of wheat.

In the kingdom of Prussia, according to an article in the Annalen der Landwirthschaft, &c., vol. IX., by Dr. Julius Munter, the loss could not have been less than one-half of the crop, and perhaps more. Instances like the following are mentioned in different districts: In 1844, 15,000 lbs. per morgeu, (three-fifths acre,) in 1845, 6,000 per morgeu, commonly ninety to one hundred scheffels, (about one and a half bushels,) per morgeu; in 1845, forty to fifty scheffels, and twenty-five to thirty scheffels—5,000 sacks, instead of 11,400, on the same land both years.

As to the *time* or *season* of its first appearance in England, it may be remarked that it was noticed during the two years 1846 and 1847, quite early among plants raised in frames, &c. In the month of June it is mentioned in some parts. On the Continent, too, the cause above mentioned doubtless exerted some effect in regard to the time it was first to be seen. In the United States, our notices do not seem to have fixed it at as early a date, especially in 1847. The most usual time we have seen particularized is from the 20th of August to the 1st of September. This was the case in Maine and New Hampshire, Newburyport, Nantucket, Springfield in Massachusetts, in all of which it must have been first seen from the 15th to the 25th of August. In New York, Maryland, and Ohio, previous to the 1st of September. We have been unable to find any collection of these particulars sufficient for a classification of the subject.

Some particulars as to its *appearance*, in addition to those before given, deserve record:—G. W. Johnson, who calls it a gangrene, says, that previous to the final decay, the specific gravity of the diseased potato becomes one-third more than that of the healthy tuber on account of the water it contains; when submitted to a dry heat of 200° it loses its moisture and the progress of decay is retarded if it be not stopped. Except in cases where it is inoculated also, it appears first at the end connected with the stem. This he considers against the fungus theory, as in that case the pores would have vegetated first, or at the same time, as also that salt would destroy it, which it does not. The putrid matter is such that even when salt has been applied to it, it will inoculate sound potatoes.

Another writer, speaking of its appearance, says that he has examined it closely with a microscope, and that its appearance is of little white oozings, in bunches of eight to forty, or more, connected like bunches of insects' eggs, of a conical shaped and of a shiny, icy appearance. These spread and form a mass like little lumps of starch, and, when dry, feel like starch; then they decay, and blotches are noticed where they were first observed; then succeeds a white mildew or fungus, on which the decay goes on very rapidly. These appearances are at the base of the eye of the tuber. Prof. Petzholdt says, the disease commences by a discoloration of the substance of the tubers, with a matter, and then after a time it disappears. The second stage is marked by an odor like old cheese, which disappears in the last stage. When examined by a microscope at first, the fluid in the cells becomes turbid, then a brown matter deposits on the side of the cells, which are gradually destroyed; the fluid then evaporates, and the tuber becomes hard and dry.

In the early stage of the disease the proportion of water and organic matter is large, and of starch is less than usual. The ashes of the diseased tubers being examined, are found to contain less alkali, sulphuric acid and chlorine, but more phosphoric acid and magnesia, than of the healthy ones. He describes the nature of the disease to be an increased formation of azotized matters, and a diminished production of more azotized organic matter.

In fixing the causes, he gives as the fundamental one, a preponderance of magnesia and phosphoric acid over the proportion of alkalies and chlorine and sulphuric acid. In addition he supposes that there are accidental or special causes, which are unknown to us. His remedy is a new system of manuring by supplying the deficient substances to the plant.

There are some interesting facts stated by different individuals, respecting *experiments* tried by them and which as they do not admit of any general classification may be noticed here.

A sound potato was tied against the diseased part of an unsound one and placed on the cellar floor. In a month the sound one was not affected; thinking the skin might hinder it, the experimenter removed it and placed them as before; in the course of two or three months they were again examined; the diseased one was thoroughly rotten, the healthy one sound still, and although several minute specks of the fungus showed their attachment to the potato, they could not enter more than the fortieth part of an inch. This the experimenter considered evidence that the fungus could not make its way among the cellular tissue of the tuber just as it chose, but must wait to have its sprouts circulated with the plant in vegetation. This done, the the work of destruction is easy.

Another experiment is given:—The potatoes were all carefully selected, put into garden pots with their several mixtures covered over with moss, and then buried one foot six inches deep in the ground, except Nos. 10 and 11, which were laid on the ground. The experiment began on the 3d of September, and they were examined on the 13th of October. The result was as follows:

No.	September 3d.	Mixture.	October 13th.
1	5 sound potatoes.	Lime.	All sound.
2	5 do 1 diseased.		5 sound, 1 diseased.
3	5 sound potatoes.	Charcoal.	All sound.
4	5 do 1 diseased.		5 sound 2 diseased.
5	5 sound.	Soil.	All sound.
6	5 do 1 diseased.		4 sound 2 diseased.
7	5 sound.	Nothing mixed.	All sound.
8	5 sound 1 diseased.		5 sound 1 diseased.
9	5 sound 5 diseased.		All got worse.
10	5 sound.	Open air.	5 sound.
11	5 sound 1 diseased.		5 sound 1 diseased.
12	5 do.	Carbonate of Ammonia.	All very badly diseased.

The diseased potatoes were all much worse.

In Nos. 2, 4, 6 and 8, where a diseased potato was placed in the midst of sound ones, there was not the slightest indication of the disease being propagated by contact, except in No. 6, one potato appeared a little diseased, but not at the point of contact with the diseased potato, so that probably the disease had commenced unnoticed, before the potatoes were selected, for several instances have occurred to the experimenter, which prove conclusively, that contact with diseased potatoes does not produce disease in sound healthy tubers. Those in No. 12, which were mixed with a small quantity of carbonate of ammonia were all much diseased. This induced the suspicion that the disease was caused by a superabundance of ammonia in the atmosphere. The following experiment was tried for the purpose of ascertaining this point. On the thirteenth of October, five sound potatoes were put into a jar which had had carbonate of ammonia in it, and smelt very strongly of the substance, also five sound potatoes in another jar of the same size; they were covered up closely and placed in a pine stove. On the 17th they were examined and those in the jar with carbonate of ammonia were all diseased, while those in the other jar were sound. Two of the diseased potatoes were taken out of the jar of carbonate of ammonia, and laid on a shelf in a pine stove. Green tops of healthy potatoes were at the same time put into both jars. On the 19th, they were examined, when those in the jar with carbonate of ammonia showed appearance of disease, but in the other jar, there was no difference. On the 22d those in the carbonate were all quite black, looking as the potato fields did in August and September, while the leaves of those in the sound jar only became yellowish, as if from natural decay.

The editor of the London Gardeners' Chronicle, gives a curious fact from his own observation. He received a specimen of old potatoes of 1845, (this was in 1846) which had been accidentally put away in a box of shavings, and kept in a dry place, where they formed internal tubers which by degrees burst through the skin. They were placed on a library table and remained there a month apparently healthy, and gradually became green and purple. But in a few weeks they were found to be attacked by the true potato disease, and when cut acquired rapidly a deep brown color. No fungi appeared on them till long after they were attacked, and then the species was not the *botrytis.*

In an experiment by another person, a garden frame was placed over two plants in a hot-bed and preserved there free, while the rest suffered. On taking off the light the very next morning, they were found spotted in their leaf.

Some potatoes were planted with manure incorporated with the whole of the soil, and others with manure placed above and below the tubers. The former had not one decayed potato in fifty, the latter at least one in ten. In another experiment the manure in one case was spread over the whole ground, at one end of the rows, and at the other end placed with the sets in the trenches. The abundance of diseased potatoes in the latter portion when dug, showed to a foot, where the change of cultivation began.

A singular fact is stated with reference to some potatoes, which were selected for seed and hung up in a sack in a dry room. Some months after, when wanted, the sack was opened and it was found that they had vegetated, and many of the young potatoes were as large as walnuts and as much diseased as any part of the crops grown on the land. This somewhat resembles the case heretofore mentioned in one of our reports, of a potato left in the cupboard, which also vegetated and was diseased, and forms one of those anomalies of which Sir Charles Lemon says this disease exhibits, more than any other he ever knew.

As it is desirable that the aspect of the disease, when subjected to examination, in different countries should be compared, we therefore quote the statements of some *men of science* in the various countries where it has prevailed:

Professor Kersten, of Freiberg, thus sums up his description of the results of his own experiments. We translate it for the purpose, from the Landwirthschaftliche Dorfzeitung, (Agricultural Village Gazette,) of Lōbe. He says: "the new disease, at least in its first stages, is characterized by a decomposition or a chemical change of the cellular tissue, or of the starchy fibrous matter of the sound potatoes. This cellular tissue, by unknown causes and operations becomes changed into a brown substance, insoluble in water, but soluble in alkalies. In the alkaline solution, by means of dilute mineral acids, it is deposited in the form of brown, light scales, the essential properties of which, are like those of humic acid, or a modification of humus. The outer, thick or concentric layers of the single grains of starch meal, appear to be first decomposed in the progress of the disease by which means the inner ones are brought into direct contact with the diseased cellular tissue and then gradually undergo a change and decomposition.

This disease, in its first stages especially, dissolves the fibrous cellular tissue of the potato tubers, and the destruction of the grains of starch meal is probably a consequence of this decomposition or change, so that the name of *cellular rot*, given by Professor Kutzing, of Nordhausen, is a very distinctive and appropriate one.

Many of the French and Belgium chemists, have mentioned that the grains of starch meal suffer no change or destruction. My observations in my experiments are directly contradictory to this, as well as Professor Kutzing's. He maintains that in the last stage of this disease the whole potato tuber passes into a putrefactive fermentation, and becomes changed into a rotten fluid substance."

Professor Blum considers the disease to be an accumulation of the unelaborated juices, or a general dropsy of the plant. "It cannot be a deterioration, as it is produced in new seed introduced from America. It has its origin, probably, in the moist and inconstant weather, which operated injuriously, especially about the time of the formation of the starch meal in the tubers, which is destroyed by the accumulation of much unelaborated juice, in the whole plant." Professor Blum frequently had occasion to observe, in Java, the same disease which usually is seen in moist high ridges, as it now less attacks potatoes on dry sandy soils.

Dr. Conrad Schauer, professor of botany in the university, Griefswalde, in a treatise on the subject, after describing the appearance of the disease, in which he differs from Professor Kersten, as to the decomposition of the grains of starch meal, assigns the following as the cause of the disease, which we also translate from his treatise on the subject:

"The internal cause of the disease lies, as I am convinced, in an *imperfect process of assimilation* This, the watery cellular juices in excess indicate, which, in a regular and perfect exercise of the power of assimilation, would have been converted into solid substance; further, also, the fact is seen from the recent crude cells which have not come to the development, and which exist in the outermost layers of the tissue; and finally, the same thing is most decisively shown by the great liability to the attack of the cellular skin, which, in the rot of the stem especially, undergoes decomposition. This tendency to decomposition of the cellular membrane, also clearly shows that the otherwise sound potatoes, this year, easily run into the dry rot, in the wounded places in every case of being cut in hoeing, or becoming mouse-eaten, &c.; while, at other times, a simple crust is formed on the drying up of the place wounded, or the common wet rot intervenes, which the cellular substance resists the longest. Usually the *perfectly developed cellular substance* belongs to the most insoluble and undecomposable vegetable substances that are assimilated."

The opinion of count Gasparin, an eminent French scientific agriculturist, is, that the potato disease is a sort of *vegetable cholera*. He mentions, that in the south of Europe two crops of potatoes are obtained in one year. The first crop is planted in March and harvested in June; the second is planted in July, after the wheat is cut, and taken up in October. The first of these crops was absolutely sound; the second was diseased. The following table is given by him as to the state of the weather in 1845, to which his observations now referred to relate:

	First Crop.		Second Crop	
	1845.	Usual mean.	1845.	Usual mean.
Mean temperature,	13° 5′	14° 4′	19° 0′	19° 6′
Mean of minima,	6 1	7 2	11 0	12 1
Mean solar heat, at 2 P. M.	31 7	43 7	40 1	40 5
Temperature of the earth, 1 yard deep,	10 6	11 6	17 6	18 4
Number of showers,	47 0	32 0	38 0	30 0
	m. m.	m. m.	m. m.	m. m.
Quantity of rain,	200.5	215.1	319.2	287.6
Evaporation,	781.7	918.5	929.0	978.4
Cloudiness, (100 parts,) represent the heavens completely covered with opaque clouds intercepting light,	12.4	12.1	6.9	10.6
North wind, No. of days,	75.5	76.6	69.0	74.3
	m.	m.	m.	m.
Force of north wind per second, and mean of each day,	6.0	4.8	5.2	4.4

It would appear from the above, that the second crop in the south of Europe suffered, though it was grown under the highest temperature, when there was no greater difference from the average quantity of rain than occurred in the first crop which was sound, while evaporation was most active, and when the sky was clearest. M. Gasparin concludes, that no customary meteorological phenomena can have been the cause, and, that those who rely on such an explanation must have recourse to conjectures which there is no possibility of verifying, in short, that in this case, as in that of the Asiatic cholera, meteorology is incapable of explaining the cause. Prof Lindley, from whose magazine we have taken the above, though an advocate for an atmospheric origin of the disease, says in view of count Gasparin's facts. We are afraid that count Gasparin is right," &c.

Mr. Milne, however, a gentleman distinguished for his knowledge of meteorology, &c. adopts the view, that there was *something in the atmosphere* which *specifically caused the disease.* He bases his opinion on the following reasons:

1. It is well ascertained that in 1845 and 1846, other plants and shrubs were affected, simultaneously, with the potato. This was the more remarkable, as in the year 1846, from the fineness of the season, the vegetation was most luxuriant, and while in 1846 these effects on shrubs and even trees were noticed in both highlands and lowlands of Scotland, in 1845 they were not observed in the highlands, where during that year the potato disease was likewise unknown.

2. The parts of the potatoes, and other plants affected, were those exposed to the air.

3. The only cases where the potato plants were generally saved, were either when the tops had been cut off or pulled up, before the plants became diseased, or where they had been effectually screened from the blowing on them of the external air. He quoted many cases, in which potatoes covered with cabbages, indian corn, tall weeds in gardens, and frames, and in out-houses, where there was no draught of air, had been preserved. In some instances where a pane of glass had been broken from a frame, the potatoes near it exposed to the air at once became spotted, while the others at a distance and unexposed were not affected. Particular fields, also, were mentioned where the streaks or parallel bends of the blight were found to coincide with the direction of the wind, and to have been produced by single hedge-row trees on the windward side of the fields.

Assuming this to be a true account of the source or origin, Mr. Milne next describes its nature or properties thus: By elaborate meteorological tables he demonstrated that it could not be ascribed to the ordinary elements of the weather. As to humidity to which it is attributed by Prof. Harting and others, it could not be attributed to this, because in England, in 1845, the quantity of rain which fell, (where the disease was the worst,) was rather less than usual, and in the highlands (where the disease did not then appear) rather more than usual; and the moisture suspended was rather less than usual all over Great Britain. There had been many years in which there was much more rain and moisture than in 1845. As to the temperature it is true that in 1845, in England, it had been 5 to 7 degrees, and in Scotland 2 to 3 degrees less than the average, yet when it was considered that the potato grew equally well in Orkney, with an average temperature of 46 degrees, and in the south of England, with an average temperature of 58 degrees, it was evident that it could stand much greater variations of temperature than had occurred in 1845; and this theory was put completely to rest by the weather of 1846, which in Great Britain during the summer months was from 3 to 4 degrees warmer than the average. If this atmospheric agent was not to be identified with any of the ordinary elements of the weather, the only alternative was, that it was some foreign matter diffused through the atmosphere.

Mr. Milne supposed it to be some compound organic body, capable of being neutralized in its noxious effects by certain gases. In support of this view he instanced the case of potatoes untouched in the vicinity of the copper works, where the copious fumes of sulphurous and arsenious acids overspread the fields so as to blight the pastures, and others near lime-kilns, and that in some places along the sea shore they were attacked not as soon: These various gases he supposed by their antiseptic properties exerted a saving influence.

He likewise inferred that this deleterious matter was heavier than atmospheric air, because the low grounds were generally first affected, and this could not be because they were the wettest, as in the best drained lands the disease was the worst. The presence of fogs which gave out a sulphurous odor previous to the appearance of the disease or simultaneous with it was also mentioned in proof of his view.

He drew, therefore, the conclusion that the atmosphere in 1845 and 1846, had over a large part of the earth's surface, been impregnated by some subtle or highly comminuted matter of a nature to be injurious to particular plants. Dr. Christison some years since showed by experiments that sulphurous chlorine and certain other gases when mixed even in so minute a quantity as not to be perceivable by the smell, would injure and ultimately kill plants; and it was interesting to observe that the effects thus produced by artificial means were precisely similar to what occurred in 1845 and 1846, the injury being first shown by spots on the leaves, and then descending by the footstalks. This coincidence is the more remarkable as one of the gases operated with (the sulphurous) is heavier than atmospheric air, and might therefore have been expected to have attacked the stems before the leaves.

Mr. Milne adds, that if the foregoing theory is correct, it might be presumed that the matter impregnating the atmosphere would be to some extent injurious to animal life. This, he states, is verified by the experience of the years 1845 and 1846. During both years there prevailed pulmonary complaints among mankind, and also among cattle and sheep, to a much greater extent than usual. The mortality of England and Wales had for the three months ending September, 1846, exceeded by 30 per cent. the average of the same quarter during the eight years in which the registration of deaths had been carried on; and in some counties the mortality had been double what is now stated.

As to the origin of this noxious matter it was he said impossible to conjecture. It could not be of local origin, judging from the great extent to which it prevailed. It appeared to have moved over the part of the earth's surface where he was in Great Britain in the year 1846, in a direction from S. W. to N. E. judging by the dates of its arrival at different places, the streaks of blight in fields and the sides of plants first affected.

If his views were correct, he said the failure of the potato plant for two years in succession seemed to show that the atmosphere had become unsuited to its cultivation.

Mr. Milne's views above given are entitled to consideration, and the arguments by which they are supported are at least characterized by much plausibility. His theory too, if the fact of such a miasma were established, would account for many appearances, and perhaps more of the anomalies of the potato disease than any other. They would also agree with the chemical analyses perhaps in almost all cases. It would be interesting, were the experiment to be made with some of the gases he has mentioned on the potato in growth, to see if it would produce the same state of the plant and tuber, which is found by microscopic investigation and analysis to be the case in the diseased potatoes.

It may be here mentioned that there are several instances in which a striking coincidence of a heavy and insalubrious fog was immediately followed by the spotted appearance of the potatoes.

Dr. Kemp in the opinions expressed by him to the Cambridge Philosophical Society, as also to the British association for the advancement of science, considers it as a deduction from his analyses that the nature of the morbid affection in the potato tuber, consists in an abnormal tendency to premature generation. He maintains also, that the truth of this deduction of his, is proved by the progress of the growth of the tuber.

An opinion has been advanced with much pretension by Mr. Smee, a Fellow of the Royal Society, attributing the disease under consideration to the attacks of an insect which he names the *aphis vastator*. This insect, he contends, sucks out the juices of the plant, and he grounds his opinion on the fact that the aphis is found on the potato plant; that it multiplies very fast; that it punctures the leaves; that it fills the air with its myriads; and that where the insect has damaged the leaf of the plant, the same is much influenced by wet weather; that the first appearance of the disease in a healthy and previously damaged plant is always subsequent to the visit of the destroyer, and the amount is directly proportionate to the number of insects which take away the vital fluid of the plant. This theory, were the grounds even stronger than they are, would still be utterly irreconcilable with many of the facts which have been observed. But the pretended facts are many of them incorrect. Rotten potatoes and even those in all the stages of the disease have been observed without the appearance of this insect.

Another writer too, who claims to have made a minute investigation of the diseased potatoes by the aid of a powerful microscope, asserts that so far from the aphis preying upon the potato, this insect actually seizes the fungus which is found in the potato so diseased. The whole account is interesting, but we have not time to pursue it to the length it might need.

The theory which maintains the *fungus* to be the cause of the evil, and which was perhaps the prevailing theory at the time of our last report, is less confided in at the present time. It has had many able advocates, among them were Professor Morren of Liege, and the Rev. M. J. Berkley of England, distinguished for his knowledge of the fungi, and some of the scientific men in our own country. But the further investigations seem to have shown that the *botrytis infestans* which was the fungus supposed, is by no means the only one which is found in the diseased potatoes, for as many as seven different kinds are mentioned. This, therefore renders it improbable that the supposed fungus could have occasioned the disease.

It is likewise rejected, for the reason that salt which is known to be destructive to the fungi tribe, and especially to the supposed one, does not destroy the power of the diseased matter. Instances are cited in which the diseased substance after salt has been applied, has been tried successfully to inoculate the sound potato. Again, no fungus has ever been found on a sound and healthy potato, but in all instances the parasite is found in a state of the substance of the plant that has undergone a change.

It is not denied but fully admitted that fungus is a most common attendant or consequent of the disease, though it is asserted and apparently on good authority, that the disease sometimes exists where there is no sign of the fungus. It wound seem, therefore, that the fungi, like the insects which are found in the diseased plants, are not its cause; and we are left to conjecture still what may be the source of the malady.

Though we are in the dark as much as ever, and perhaps may never be able to ascertain the true source of the evil, still very considerable advance has been made in the progress of the knowledge with reference to its character. The origin is unknown; but many suppositions have been disproved. The numerous experiments which have been made have shown that it was not merely owing to the deterioration of the plant by excessive cultivation; for the disease has affected those which have been imported from the original country of the potato, as well as seedling varieties. At the same time it would seem that the constituents of the plant must have some influence, for some varieties are far more susceptible than others. There are some points which appear to be established—that early planting has generally been most successful, that dry, light soils, unmanured ground, especially such as has been recently burned over and broken up, are the best. In some instances planting corn or sowing barley with the potatoes has proved favorable. The effect of charcoal, lime, tan, bark, &c., has in many cases, proved very useful.

Much learning has been brought to bear on the investigation of the evil and many of the treatises on the subject display no little acumen, and furnish valuable information respecting the history of the plant and its internal structure. One of the best things on this subject we have seen is the microscopical examination of the whole plant, in a sound and healthy state compared with the diseased one, by the veteran mycologist, Corda. This is a very admirable article and is illustrated by colored plates, and perhaps may hereafter be translated and laid before the American public.

The treatises of Petzholdt, Albert and Isenlee, Payen, Harting and of Dr. Munter are also interesting and contain much valuable information. These likewise are illustrated with plates.

Among those who have written with ability on the subject in Great Britain, are Professors Lindley, Johnston, Playfair, Messrs. Milne, Berkley and many others. The condensed summary contained in the Transactions of the Highland and Agricultural Society of Scotland, of the state of the disease in Scotland is worthy of careful perusal by those who wish to study the aspect of the disease in that country. At the meeting of the Royal Agricultural Society of England, and the numerous county associations and farmers' clubs, there have been likewise able and thorough discussions by men of the first science in Great Britain, as well as facts presented by practical agriculturists, which are embodied in the various agricultural journals of that country. Professors Daubeny, Henslow and Fromberg have directed to the subject their chemical knowledge, and the result of their investigations likewise have been given to the public. The article furnished by Professor Fromberg, on the chemical investigation of the potato to the Transactions of the Highland and Agricultural Society of Scotland, and for which he received the premium of that society of fifty sovereigns, contains a vast number of valuable facts, relating to the analyses of the sound and diseased potatoes and will well repay the perusal.

In France, Netherlands, Holland, Austria, Belgium and Prussia likewise, the subject has been presented at the societies of the learned and at the conventions of agriculturists; and the reports and discussions exhibit a minuteness of examination characteristic of the science of the men engaged in it; one directing his attention to one branch and another to another, but combining to furnish the most ample presentation of the varied facts, and elucidating many points in relation to different bearings of the whole question on national and individual welfare.

The following queries which were published in an English journal in 1846, embody many valuable suggestions, and as they present the various theories which have been adopted in a small compass, and touch upon the arguments by which they are supported, may perhaps be usefully quoted here: We omit the first section as of no practical value.

B. *Atmospheric influence.*—Have we not abundant evidence of this existing cause? 1. In the numerous cases where the stalks have been blighted and the tubers remained sound? 2. Where whole fields and even parts of fields have blighted are one aspect; while those contiguous in a different aspect continue to flourish. 3. The places of shade and shelter often distinctly marked out from the surrounding growth; by the hearty appearance of one, while the other has withered? 4. The blight appearing suddenly and widely along the track of offensive fogs, and peculiar atmospheric changes? 5. The very general outbreak of the disease last year, upon a particularly sunless season; and its restraint this bright summer till the rain set in? and 6. Must not the Danish report and those of Holland, France and Belgium have weight also in this query?

C. Have we not equally sufficient evidence of *tendency* to disease in the plant? 1. In the numerous cases of its appearance in the tubers, whilst the stem and leaves were flourishing; and even in the pits and heaps after the crop has been stored sound? 2. In its not less frequent beginning at the top root, or just above the old set. And 3. often at a critical period of growth just when the flowers were turning; so that where several kinds grew on contiguous plots, each showed the disease at this period, though weeks sometimes intervened? 4. In the remarkable tendency to precocious growth distinguishing the disease, wherein tubers in the very act of putrefaction, throw out strong and luxurious shoots?

D. Have we not further evidence that this predisposition is *putrescent?* 1. In the increasing rotting character of the diseases of this plant for the last fifteen or twenty years. 2. In the increasing care required for some years past, to prevent the tubers heating in store? 3. In the rapid rotting of the tubers (as above noticed) while throwing out shoots apparently vigorous, as if manuring them? 4. Is not the success of autumn planting due to the shoots acquiring strong roots in the soil while the set is destroying, and thus gaining the means of more wholesome nutrition before spring growth? And 5. Is not this what might naturally be expected from inoculating the plant with dung juice (by the raw surface of the set) yearly for nearly a century, until the composition of the sap is in a state of unstable equilibrium, susceptible of any putrefactive exhalation, and thus ready to act the part of dung upon its own shoots, as above noticed?

E. *Putrescent Manures.*— Although open to more exceptions, is there not a sufficient preponderance of the evidence of the ill effects of fresh and rank dung? 1. In the Scotch reports and others. 2. In the virulence of the disease in Holland and Belgium, where night-soil is largely used. 3. In its not much less virulence in the Irish lazy bed culture, under the rankest of manure? 4. In the comparatively mitigated damage where soot and charcoal materials have been substituted for dung, and where the plant has been grown on undunged peat, which is anti-putrescent? (until this season, when the spawn of last year's fungi may be supposed to be carried in the sap.)

F. *Fungus*, (and infection.)—The agency of fungi in originating the disease is also much questioned. 1. In this country the majority of the cases where the tubers are first affected, would probably be against it; while 2. Those in which it appeared first in the leaves would give the predominance to the fungi; and if we add, 3. The Belgium and Danish reports, in which the disease is attributed entirely to the fungi, the majority will be large on that side. On the other hand, 4. It is certain that in many cases, the decay has appeared before, and even without fungus of any kind; nor can the tendency to precocious growth, as above, (C. 4,) be attributed to fungus. The results of the investigation into the *infectious* character of the rot are not less conflicting, so far as regards the tubers; but in the leaves and stems. 5. It has often appeared in small patches, extending more or less rapidly in all directions. 6. Other plants allied to the night-shade family, though without tubers, (as the tomato, &c.) have taken the disease this season; nor is it even confined to such species. Will not a general review and comparison of the cases, (rather too complex to sum up in one sentence,) lead to the inference that the fungus is generated by the disease in the struggle between the vital and material forces; that it becomes a symptom and a medium of infection by contact and even by aerial communication?

G. *Soils.*—Last season the disease appeared worst on rich, wet and heavy soils, and least on those which were dry, gravelly and peaty; but this year, when the infectious spawn is likely to have been carried in the sap, we hear less of this distinction. The facts, however, as well as reason, warrant us in regarding dry and antiseptic soils as least predisposing to putrefaction?"

The above summary seems to be a fair view of the case as it stood in 1846. Since then there has been but little change, except that probably the fungus theory has lost ground, and the minds of men seem to have settled down to regard it as an inexplicable phenomenon, existing in a variety of conditions, in different degrees of intensity, and affected more or less by a vast number of circumstances, and for which, as yet, no sure remedy has been found. Various precautions and applications seem to aid in lessening its effects at times, which at others are utterly vain. Perhaps the most prevailing view is one similar to that of Count Gasparin or Mr. Milne, as mentioned above, though even this is embarrassed with difficulties.

We may embody the result of the examination we have been able to make into the aspect of the disease in our own and other countries, in something like the following:

1. There is probably *some prevailing generic* cause, which lies at the bottom of the evil, and produces the peculiar *similarities* that are observed.

2. This admits, however, of local subdivisions or *subordinate* causes, which produces the *dissimilarities* which seem so irreconcilable with each other.

3. These local or subordinate causes also exert a *modifying* influence on the developments of the generic cause.

4. The generic cause, whatever it may be, is most *extensive*, as to the region of the earth, climate, soil, modes of culture, variety of potatoes, time of appearance; since it more or less affects the fruit in all these respects.

5. There are certain usual *attendants* or *accidents* of the disease, which are sometimes confounded with its causes, but which rather sustain the relation of coincident results.

6. Among the *effects* produced by the generic cause, are chemical changes, developed by chemical analysis—and structural and physiological ones developed by microscopic investigation.

7. There are numerous well attested *facts*, which seem to admit of no classification, but stand comparatively *isolated*.

8. There are certain *remedies* which seem to be *useful*, yet cannot be considered unfailing or entirely successful at all times.

9. The evil is *fluctuating* even in the same regions, and its progress is hastened or retarded by the state of temperature and the season generally.

10. *No one of the theories* which have been presented appear to *meet all the difficulties of the case*, and time only can show what is to be its effect on the question whether the cultivation of the potato is to be continued or must be abandoned. As yet the latter alternative does not seem to be demanded. While there is much to discourage, there is also somewhat to encourage. Some sections of our country which have heretofore been visited, have apparently recovered, and this year furnish no complaints of the evil before experienced. In our Appendix will be found some of the views of correspondents and others, but we have not chosen to enlarge upon them. We could say scarcely less on a subject which is certainly an engrossing one in many countries. We regret that a sort of despair as to further investigation seems to have taken hold of the minds of most of our farmers, and hence they have become less attentive to examine and report facts. Still it would be well to watch the progress of the disease, and by instituting new experiments to throw any additional light which might be obtained into the common fund, for the benefit of all.

As we have suggested the propriety of continuing observations and experiments relating to the potato disease, it may be useful also to suggest some points towards which the attention should be directed. It may be that every one, if not able to give his attention to all the subjects of inquiry, yet may notice some one or more, and by the combination of those in the same vicinity something may be effected.

It is important, then, that the following particulars be noted:

I. 1. Soil, kind, and where practicable, an analysis of its constituents and chemical peculiarities.

2. Situation, or lay of the land, high or low, general exposure, &c.

3. Condition, dry or moist, new or old in cultivation; timbered or prairie previous, and where practicable, geological peculiarities.

II. 1. Preparation of soil, previous crop or rotation, mode of ploughing, &c.

2. Manuring, kind, time and mode of putting it on.

III. 1. Seed, kind or variety, condition in which planted, whole or cut, &c., with preparation of time, &c., method of planting, hills, ridges, &c.

2. Time of planting, state of the weather, moist or dry; temperature, hot or cold, &c.

IV. 1. Mode of cultivation: manure or other articles added subsequently, &c.

2. Time of first appearing above the ground, aspect; whole period of cultivation.

3. Temperature, hot or cold; weather, moist or dry, cloudy or clear; winds, their direction during the period of cultivation; note the range of thermometer, number of days of rain and amount which falls, effect of these and of different winds or fogs, &c., on the crop.

4. Accidents, as the contiguity of any kind of manufactures, &c., by which gases might be generated; shades, &c.

V. 1. First appearance of any change in the *tops;* time; describe it as to parts of the leaf or stem, whether above and below the ground simultaneously, or order of time, color, nature and operation, with its progress of development, if practicable experiments, mowing off the tops or removing balls, &c.

2. First appearance of change in the *tuber;* time; describe it, and trace the progress as above; experiments and analyses in its progress; situation of the tuber—near the surface or deep—near the centre or more remote—on the same or different stalks—nature of the affection, &c.; characteristic changes; remedies, &c.; effect of removing diseased tubers; chemical solutions, &c.

3. Comparison with respect to adjoining fields; situation.

VI. 1. Time of gathering; amount; proportion of sound and unsound or diseased; generating power of diseased potatoes, &c.

2. Influence of contact with each other; effect of being left in the ground beyond the usual period, &c.

3. Modes of preservation, &c.; drying, &c.. in cellars, storehouses, &c.

4. Use or value of diseased tubers—injurious or not to animals; starch, flour, &c.

VII. 1. In connection with the character of the disease, the question deserves notice how far it appears to have been propagated from the seed tubers or dependent thereupon, and condition of the old sets, and if any unusual changes had taken place.

2. It would be well likewise if various compounds were tried, such as might be conjectured to constitute the gases that might operate in the atmosphere, and then effect on the plant and tuber noted.

Among the substitutes for the potato, are the application of a great variety of other vegetable products, in combination with flour, to the making of bread. Numerous experiments are related of this kind, many of which have been successful. Scarcely any of the esculents have not been resorted to. The beet, carrot, turnip, have been mixed in various proportions with the usual flour paste, and excellent specimens of bread produced. To quote the descriptions would fill too much space, and probably could be of little use to the people of our country, as it is scarcely to be imagined they will be exposed to the necessity of using them. The nutritive qualities of these vegetables, as well as of beans and peas, have been accurately investigated, and the results are valuable.

HAY.

Although this crop was included in the returns of the census in all the states, yet in quite a number of them there is very little attention paid to the cultivation of grass, and the hay mentioned is nothing more than the product of the wild uncultivated grasses, which grow spontaneously and clothe the fields and prairies. This fact renders it difficult to form an opinion respecting the amount.

The cultivated crop is confined principally to the New England and middle states, with one or two of the north-western ones. The season, on the whole, appears to have been favorable to the production of hay. The change which occurred in May and in June brought forward the grass very rapidly, and the warm weather, which allowed its being well cut and prepared, no doubt very considerably enhanced not only the quantity but the quality of the crop, so that the hay was sweeter and more nutritious than often times is the case.

In Maine it is estimated at from ten to twenty-five per cent. more, and the average crop is thought to have been from one to one and a half tons per acre, though sometimes three or more tons are raised. In the previous estimate of hay in this state, we have corrected an error which has reduced the amount from 1845, though it is a regular advance since the census. In New Hampshire, also, the increase is given as about twenty per cent. more in some sections on account of the good season. The same was probably the case in the other New England states, though in parts of these states there may have been a deficiency. The general average product may be fixed at about one ton to two tons per acre.

The reports from the state of New York also are favorable—the increase is estimated variously from ten per cent. to twenty, twenty-five, and even fifty per cent. The usual average as given, is about one, one and a half, or two tons per acre. The crop of the year 1845, it will be recollected, was a short one, having fallen off from that of the preceding one.

The accounts respecting the appearance of the hay crop in Pennsylvania are somewhat conflicting. In one section there is represented to have been some decrease owing to the drought and cold spring, in others it was supposed there may have been some ten, twenty, or thirty per cent. increase. The crop of 1845 was a poor one, and, compared with it, we believe that the crop of 1847 was an increased one. As we proceed on towards the south we believe that there was some gain, though we find the usual fluctuations.

Ohio cultivates a moderate quantity of hay compared with other crops, and while in some of the counties there was a partial falling off from drought, yet taking the whole state the reports furnished are favorable, and in some instances the increase is supposed to have been twenty or twenty-five per cent. more than in 1845, and the average crop rates from one and a half to two tons per acre.

The hay crop of Indiana has probably been rated too high, if we include only cultivated hay, as seems to have been the case in the census returns; as for some years we have included the amount also cut from the natural prairies, it would be best for the sake of better comparison to refer again back to the corrected returns of the census as a basis, and in so doing we must of course lessen the hay crop of Indiana, as well as the aggregate for the whole United States. This fact also should be taken into consideration in any future comparison of our tabular estimates. The hay crop of Indiana and Illinois, with scarcely an exception, appears to have been a good one, and in comparison of the crop of 1845, there was an increase of twenty, twenty-five, thirty, or fifty per cent. By some, in certain sections, it is set as high as three or four times larger. In Michigan, likewise, the crop of hay is reported to have been a good one, and in some cases double that of 1845. It is a crop, however, that excites much less interest than many others, and therefore it is difficult to form any very accurate judgment respecting it. In the whole aggregate of the United States, our impression is, it will be found to have been a better crop than that of 1845, though probably the increase will not be very large. We have also, in some cases, modified our former estimates by a renewed reference to the census returns, so that there may be some variation in the column from what there would otherwise have been.

It will be recollected that mention was made of the *tussac grass* of the Falkland Islands, in one of the former reports of this office. It appears now that attempts have been made to cultivate it, in Scotland, on the estate of the Duke of Richmond, and they were successful when sown in peat.

Another successful experiment, in Ireland, is mentioned in the Irish Farmers' Journal, and the person by whom it was tried remarks:—"I have no longer any doubt of the tussac grass being freely introduced within a short period." In the Journal of the Royal Agricultural Society of England, is likewise a letter from the governor of the Falkland Islands to Lord Palmerston which speaks very highly of the capabilities of this plant. It is relished by cattle and horses, and although of slow growth, being three years in coming to perfection, yet could be cut annually. It grows to the height of seven feet by the end of summer, though cut in the spring after it has once reached its maturity. A plate is also given in the work referred to illustrating the appearance of the plant.

In a letter of the Hon. Henry A. Wise, late minister to Brazil, to the Commissioner of Patents, and published in the Union some time since, he speaks of a species of grass called "capine," which constitutes the chief green food of the Brazilian horses and cattle, the main value of which he states is, that it stands the drought in a hot climate and sandy soil. It grows in rich soil to an immense height; single stalks or tufts reaching as high as seven or eight feet. But usually it grows three or four feet high, and is then cropped. It is perennial and not allowed to seed. As soon as cut, the stubble is hoed into the ground, and it springs anew from the joints. It is succulent and fibrous, and yields a large volume of grass, is not good for cured hay, nor very nutritious, but it is excellent to supply green food in a hot and dry climate, on a low, dry, and sandy soil. He felt sure it would be of great importance in the southern portions of the United States, but was not sure that it is not there already. North, it would require to be sown every spring and summer. In the tropics it is perennial, and takes root from the joints like our wire grass. It has a long and broad leaf and is very luxuriant. It would not be good hay, but would be, as he thinks, fine for green food, and for green cropping and liming.

A species of grass is mentioned in the account given of the meeting of the Royal Agricultural Society of England, on the 12th of May last, which is called the *alsike clover*. It is described under the name of *trifolium hybridum*, as being indigenous in Sweden, where for the last hundred years it has been cultivated in the native pastures of that country, and in some instances it has been known to grow to the height of five feet there, though in England it reaches to that only of two feet. The roots are fibrous and the heads globular. It more resembles the white than the red clover, and may be described as a giant white clover, with flesh colored flowers. It yields two mowings annually. Linnaeus noticed it growing in poor, bare, obdurate clays, where no other plant could be made to vegetate; but even there this clover is said to have flourished with uncommon luxuriance, and yielded shoots as tender and succulent, though not so abundant, as if reared in the most richly manured fields. Sturm says, that he tried its cultivation along with that of a great number of other clovers, placed under the same circumstances, and the result convinced him that there is no other kind of clover equal to it for feeding cattle. Erhardt also mentions it as very valuable for cattle and sheep.

It is further stated, that if the soil is in a good condition, a field of this clover will last many years in prime, though it will be necessary every other year to bring on a moderate coat of manure. When once this plant is established, it will remain for many years in full vigor, and produce annually a great quantity of herbage of excellent quality.

The best method of feeding the alsike clover is either by mowing it for hay, cutting it occasionally as green food for live stock, or feeding it down with oxen or sheep. In the first mode a large quantity of good hay may be procured at a small expense or trouble; the crop in this case must be mown as soon as the heads are in full bloom, and before they begin to turn brown or die away. When the leaves of the lower part of the plant turn yellow, decay and drop off, the crop should be cut as soon as possible, for by standing longer the plant will lose more at the bottom than it will gain at the top. This is usually about the middle of June, and it is better always to cut it too early than too late. When the alsike clover is sown without crops of any other kind, the seed may be put in any time between March and the latter end of August, but with grain it must depend on the time such a crop is sown. The quantity of seed required is from ten to fifteen lbs. per acre. This will produce many tons annually of good herbage, besides the supply of seed. It is said, also, that it bears transplanting, so that at the end of two or three years it may be taken up and planted elsewhere. It is merely divided and the fibrous roots a little cut with a pruning knife. It does not suffer from the severest frosts, nor is the foliage injured by them; freezing weather merely suspends its growth; its propagation may be greatly extended, and it will flourish in the most barren land where very few grasses will grow. It would seem that the advantages of this plant are such that it might be worth a trial in our country. We are not aware, however, that it has been attempted. As the attempt is making to procure some of the seed, it is hoped the office may be able to distribute it in time for experiments among our enterprising agriculturists.

We have placed in our appendix, No. 6, an interesting extract from Dr. Thomson's work on the "Food of Animals," &c., in which he furnishes an explanation of the *theory of hay-making*. It will be seen that, alluding to the composition of rye grass, before and after ripening, he says: It should be the object with the farmer to cut grass for hay at that period when the largest amount of matter, soluble in water, sugar, &c., is contained in it. This is before its seeding, for then woody matter predominates. The second point is, after it is cut, to dry the grass so as to preserve the soluble part as much as possible. By a course of experiments it is found that a large portion of the soluble matter disappears when the grass is converted into hay. The result of hay-making, therefore, often is to approximate the soft, juicy and tender grass to woody matter, by washing out or decomposing its sugar and other soluble constituents.

The great cause of the deterioration, he asserts, is the water present, either from incomplete drying or the absorption of it from the atmosphere. In such a case fermentation is produced, and the sugar is destroyed. The quantity of water or volatile matter capable of being removed, says Dr. Thomson, from hay, at the temperature of boiling water, varies considerably from twenty to fourteen per cent. If this latter per centage could be obtained at once, by simply drying in the sun, the process of hay-making would probably admit of little improvement; but the best new made hay examined contained nearly twenty per cent. of water. If grass could be subjected to a temperature of 120°, the greater portion of the water would be removed, and it would still retain its green color. When examined, this dried grass consists of a series of tubes, which, if placed in water, will be filled and become very much as before it was dried. In this form cattle relish and prefer it to hay. The constituents of the grass are preserved and the sugar does not decompose. A third of the whole soluble matter may be taken up by water, and hence we see the injury produced by every shower of rain. It is likewise bleached in the sun, and, losing its green color, becomes like straw. Its wax, too, is removed. Considerations like these, are worthy of attention, and too much care cannot be taken to have the hay made properly, so as to preserve in the highest degree the nutritiousness of the grass for cattle fodder.

Different species of grass have been used very satisfactorily for *bonnet plaiting*, in imitation of the Leghorn plait.

In Sinclair's Hortus Gramincus Woburnensis, after referring to a kind of spelt-wheat which is cultivated in Italy, for the Leghorn plait, he gives a list of perennial grasses with the soil to which they are adapted. We quote it as one that may perhaps be useful to persons engaged in such manufactures, and, as the work has never been republished in this country, it is of rare occurrence now:

For Heath or black siliceous Moor soil.

Festuca ovina, sheep's fescuegrass. Straw very fine and clear.

Festuca duriuscula, hard fescue grass. Straw long, equal and clear, but coarser than the sheep's fescue.

Festuca ovina hordeiformis, long awned sheep's fescue. Straw long, clear and equal.

Nardus stricta, upright matt grass. Straw long, without joints, very fine, equal and tough; perhaps the best grass for the supply of straw for the Leghorn plait.

For Dry soils.

Cynosurus cristatus, crested dog's-tail grass. Straw fine, strong and tough, well adapted for the plait, but the culms are frequently liable to discoloration, particularly after flowering.

Poa augustifolia, narrow leaved meadow grass. Straw very long, fine, and clear, superior to the *poa prateusis*, of which Miss Woodhouse's celebrated bonnet was made.

Hordeum pratense. Straw of the best quality for plait, being fine, tough, and clear.

Anthoxanthum odratum, sweet scented vernal grass. Straw clear and straight, but frequently rather coarse.

Agrostis lobata, lobed bent grass. Straw short, but very fine, clear and tough.

Agrostis spica ventis, silky bent grass. An annua lstraw, long, fine, and clear.

Avena flavescens. Straw generally fine, bleaches well, and of an equal and tough quality.

Agrostis vulgaris mutica. Straw fine, bleaches easily, but is rather short.

Avena pubescens. Straw generally fine, long, and of a good color.

Festuca heterophylla, various leaved fescue. Straw similar to that of the *festuca duriuscula.*

For Damp or Moist Soils.

Agrostis canina fascularis, bundled-leaved brown bent. Straw very fine and white.

Agrostis canina mutica, brown bent. Straw longer than the preceding, in all other respects similar to it.

Agrostis stolerifera angusti folia, narrow-leaved, and round bearing bent. Straw long, tough, bleaches equally of a fine white.

Agrostis alba, white bent. Straw tough, and bleaches well.

Agrostis stricta, upright bent. Straw very fine, straight and tough.

Agrostis repens, creeping-rooted bent. Straw long and equal, bleaches well, though not so fine as some others.

Poa nemoralis angustifolia, narrow-leaved meadow grass. Straw very equal, fine and tough, but not so long between the joints as some others.

Agrostis stolonifera aristata, awned runner-bearing bent. Straw long, equal, and bleaches very white, but works rather soft and flat in the plait. There are many other species of the perennial grasses, which afford fine straw which might be added to the above list, but those named above have been submitted to careful trials, and are found to possess the properties stated.

Mr. Sinclair recommends those which flower at the same time and are adapted to the same soils, to be sown together. The period of flowering is stated to be the best time, as proved by experiment, in which to cut the straw for plait in imitation of that of Leghorn. In comparing the culms cut when in flower with others cut at the time when the seed is ripe, and after both have been bleached, the former have a bland surface resembling the Leghorn, and the latter a glossy surface like that of ripened grain. The culms, at the time of flowering are said also to be less hollow and more tough and pliable than ripened straw, and so easier to plait. It is, therefore, presumed that the Italian straw is taken when the plants are in flower.

The *process* detailed by Mr. Cobbett is recommended by Mr. Sinclair *for bleaching* the green straw.—The culms being selected are placed in a convenient vessel, boiling water sufficient to cover the straw is poured over them, and here they remain ten minutes; then are to be taken out and spread on a grass plat to bleach, are turned once a day, and in seven or eight days are effectually bleached. The time may be shortened if they are allowed to remain in the scalding water one to two hours and then spread on the grass and regularly watered as they become dry, turning them once a day for two days, and then washing the straw clean from the dust. Then they must be placed moist in a close vessel, and subjected to the fumes of burning sulphur for two hours. This, it is said, is sufficient to bleach straw in the most perfect manner. Green straw, also, if immersed for ten minutes in a strong solution of acetic acid, and then subjected to the sulphurous acid gas, is bleached perfectly white in half an hour. Green culms, too, plunged into muriatic acid diluted with twenty times its measure of water, and then spread on the grass, became in four days as perfectly bleached as those which were scalded and bleached for eight days on the grass. The texture of the straw was not injured by these processes. The application of sulphurous acid gas to the moistened straw, even after scalding and bleaching on the grass, had, in every instance, the effect of greatly improving the color. If the straw is moist the greatest use of the gas must be obtained, as water rapidly absorbs it, and assists its action in destroying the coloring matter without injury to the texture. When straw is immersed in diluted acid, it should be whole, for if cut the acid will get within it which is of no use in discharging the color.

To *imitate Leghorn plait* in the most perfect manner, Mr. Sinclair says the straw must be plaited in the reverse way of the common mode of plaiting split straw. The straw, also, must be wrought without being flattened, and the pressure applied after the plait is made. These two points are considered important, as by reversing the mode of plaiting, the fingers have much greater power of knitting the straws finely and closely, and thus produce the appearance of fineness which belongs to the real Leghorn plait.

HEMP.

If we may judge from the sources of information at our command, of the amount of hemp raised in 1847, it was not a large crop. Less, we are told, was sown and the product was small. In Kentucky we perceive it variously estimated at 15 to 20,000 tons, and the whole hemp crop of the United States is set by some at 30,000 tons; others considers this as evidently too high an estimate, and fix rather upon 23 or 25,000 tons. We cannot, perhaps, do better with respect to this crop, than to quote here a statement in a western journal which is said to have been handed to the paper by a merchant of Louisville. It is addressed to the editor, who says, that the author is well informed on the subject. His estimate, it will be seen, is lower than that of others.

"A merchant at St. Louis, writing to the editor of the Cincinnati Gazette, says: 'The most carefully formed estimate of the hemp crop of the Missouri river, gives the product, as in round numbers, at 13,000 tons. Add to this the product of the whole west beside, which may be set down at 17,000 tons, and you have an amount equal to 30,000 tons; from this deduct the quantity used in the west in manufactures, say 12,000 tons, and you have for export from 18,000 to 20,000 tons, or more than equal to the requirements of all northern seaports, and leaving a considerable quantity for export.'

The foregoing 'carefully formed estimate' is entirely erroneous. As it has been much copied into commercial papers, its errors ought to be exposed and corrected.

With respect to the crop of Missouri, a true estimate can be easily figured. The receipts at St. Louis show the whole crop, except that portion of it consumed at the rope-walks above. A register is fairly made at St. Louis, and published in the commercial paper, as follows:

Received at St. Louis in 1844, ...	59,292 bales.
" " 1845, ...	30,987 "
" " 1846, ...	33,853 "
" " 1847, ...	80,336 "
Total in four years, ...	204,478 "

The bales average 250 lbs., which would be nearly nine to the ton; but say seven bales to the ton, 29,211, and divide by four, and the annual average crop of Missouri is 7,303, *as large an amount as has ever been grown in that state in one year.*

Low prices in 1845 and '46 caused large portions of the crops of those years to be kept back; hence the large receipts at St. Louis in 1847, (80,336 bales,) when prices had advanced. It is well known that the old crops are now exhausted, so that the growth of 1847 alone existed in that state. No purchaser or consumer will estimate it above the average here stated, namely: 7,303 tons. It is believed to be less. In three or four hemp-growing counties (Clay, Ray, Jackson, Lafayette, &c.,) it is not near an average, the season being unfavorable, and it is believed the sowing, from want of seed, was less than an average in the whole state.

The crop of Kentucky, is more certainly known to be short of the usual average. Some estimate the deficiency at *one-half;* but, allowing for the stacked over of 1846, the deficiency may not exceed one-third or one-fourth. But, be the deficiency more or less, the crop is certainly short of an adequate supply for the bagging looms and rope spinners now in operation; and we must be large buyers in Missouri. Last year, with the accumulated stocks of 1842, '43, '44 and '45 we purchased in Missouri three thousand tons. Our shipments to the Atlantic, did not exceed five thousand tons, so that we exported of the growth of '46, and the accumulated stocks of several preceding years, only 2,600 tons more than we imported. We consumed last year 16,000 tons, and exported 2,000 tons, and had none left—together 18,000. Allowing for accumulated old crops, say 4,000 tons, the growth of 1846 did not exceed 14,000 tons. If the growth of 1847 *be one-fourth less,* Kentucky can furnish only 11,500 tons for this year's consumption. What that will be depends upon the number of looms and spinners. We have not for many years past used less than 16,000 tons per annum."

We have referred again to the census returns, and believe we are justified by them in placing the crop of Missouri, higher than the writer of the above statement does, as the whole amount included under flax and hemp, of which the last probably was the greater portion, was 18,000 tons by the census.

Some interesting statements have recently been made, respecting the *bear grass* or Florida hemp as it is sometimes called, and a specimen of it received at this office, has been sent to the Navy Department to have its capabilities for cordage tested. Should the report respecting it be received from Boston, it will have place in our appendix.

Gov. Call, in his letter to Gov. Mosely, in the Tallahassee Floridian, speaks very highly of this species of grass as a substitute for hemp, or manilla hemp. He mentions that it abounds in an uncultivated state in Florida, and as nothing feeds on it, it needs no enclosure. It naturally grows to the heighth of three or four feet, and if cultivated, might probably exceed this. The leaves of the plant are tied up in bundles, boiled and pounded until the green bark and soft vegetable matter are disengaged from the strong fibres, when they are put in the water and washed out with ease. Every plant will produce a pound of good clean hemp. 5,000 or 6,000 plants may be produced on one acre. It is considered worth eight to ten cents per pound in the New York market. He says that at this price there is no product so valuable in the United States.

In the Landwirthschaftliche Dorfzeitung, for 1845, page 204, is mentioned a *new process for preparing hemp and flax,* submitted to the Economical

Society of St. Petersburg. The mode was then secret, but in the announcement made by them of this Russian invention, they stated that the process is extremely simple; it requires no chemical knowledge of any kind, no special manipulations of the artisan; a wooden frame of very simple structure, which suffers hardly any by use, is all that is required. Any peasant can construct or manage it. Hemp prepared in this mode is admirable for spinning purposes; the flax thus prepared is not indeed better than the usual way, but suffers not so great loss; the preparation of the female hemp yields a richer and more beautiful product, and the nettle may also be advantageously subjected to the same process. Further information is promised respecting it, but we have as yet been unable to find any continued notice of it, though it may possibly have been inserted under some other heading.

In Niles' Register, vol. 3. p. 188, we have the description of a *new application* of a plant common, and before unnoticed in our country, to the purpose of hemp and flax. It is a species of urtica, to which the name of urtica Whitlowi is given, after the discoverer, who somehow secured a patent for it. The utility of the discovery is sustained by high recommendations from lecturers on botany, various manufacturers of flax and hemp and a committee of the corporation of New York. These among other things state, that though its natural situation is in low and moist grounds, it may be cultivated on uplands; that it will bear from fifteen to eighteen stems on one root, and rises to the heighth of from four to six feet; that it was considered on examination superior to any flax or hemp they had ever seen, as well in the quantity it produces from a single stem, as its superior strength, beauty and fineness of texture. That from experiments made by them, they were of opinion that it would produce from twenty to twenty-five per cent. more from the hackle, than any flax or hemp they had ever known, &c. We have been unable to trace this plant. It does not appear in the North American Botany under the title here given to it, nor do we know why it was abandoned. Possibly a new investigation might confirm the recommendations, but the fact is a curious one in the hitsory of our industrial efforts.

An interesting inention is made in the Maysville Herald, respecting a *method of preparing hemp*, by Dr. Leavitt, and we had hoped to be able to subjoin an article in our appendix in relation to his improvements, but by a letter received at this office we understand that it must be deferred till another year. If he realizes all he hopes, his discoveries will be important and even from the remarks of the editor of the journal mentioned, it would seem as if the success already obtained will be of great advantage to the public. He says, "we saw a hemp brake of ingenious construction and great strength, propelled by a steam engine, breaking hemp at the rate of two pounds per minute, or 1200 pounds in ten hours; and delivering the hemp in such condition as to be more easily and speedily hackled upon the common hand-hackle, than the dew rotted hemp of the common hand-brake, and with quite as little, if not less waste. The cleaning apparatus is also thought to be likely to prove equally effective when furnished, as its simplicity and adaptation seem to warrant this conclusion. More than the whole of the fuel necessary for one steam engine, will be furnished it is said from the hemp itself, by three brakes, and is supplied to the furnace without necessity of a fireman.

The hemp brakes stand in a line over a strong grating, beneath which is a trough, whose sides inclined inward, receive and deposit upon an endless band, running in the direction of the furnace, all the woody matter falling from the brakes and carrying it to a funnel, through which it is thrown into the furnace and scattered in its bed, igniting instantly, and keeping up an intensely hot fire. A man and two boys are sufficient to attend each brake with ease, and a third one can bear off the hemp from the three brakes, delivered in bands or endless roving to be passed through the various subsequent machinery, a portion of which is designed to supersede the wasteful hackling now in use, avoiding the manufacture of tow entirely. Connected with it is also to be an apparatus for supplying the powerful antiseptic substances now in use in the manufactories of ship cordage and canvass in England, the efficacy of which has been so severely tested in the *Niger expedition* and on the western coast of South America, so celebrated for its production in the cordage and sails of shipping exposed to that climate. The material to be used will be made at the factory, and will not cost over $5 for each ton of hemp.

If these various expectations are realized, Dr. Leavitt's efforts will prove of great value to our commercial interests, as well as probably greatly encourage the agriculturists whose attention is devoted to the cultivation of hemp, and the amount of this product will doubtless be much increased at the west.

By a recent trial it appears that the strength of a rope of this unrotted hemp, was much greater than those of American water rotted Russia or steam hemp.

In a German journal, we find the following short notice of a method of giving to hemp the appearance and fineness of flax, taken from the Italian of E. R. Ciolfi. As it is simple and easily tested, we have translated it. Make a ley of good ashes and a little lime; then allow it to become clear, dip the hemp all over in it, and leave it to steep there for a day. Afterward add to this ley for every ten pounds of hemp one pound of soap. Lastly, let the whole boil a couple of hours, and then treat the hemp precisely as you do flax.

By this operation nothing else is effected but to dissolve the vegetable glue which renders the fibres of hemp so coarse without injuring its strength.

FLAX.

Though we have no estimate of the quantity of flax raised in our country, yet considerable attention is paid to it, not only for the sake of the fibre as a material for thread, but likewise for the seed on account of its oil. In the state of New York, there is a considerable amount raised for this purpose. In Ohio likewise, it seems to be an object of interest and the profits received from it are said to be very good. Preble county is thought to be the greatest flax growing county in the United States. This year we are informed the crop has been very large, the quantity sown was larger, and the yield of seed about the average. It is estimated that 100,000 bushels of seed were raised, which allowing 10,000 bushels for home consumption, would give 90,000 for exportation. The price at 55 cents per bushel, would amount to $47,500. If some better method could be devised for preparing the lint, it would be yet more profitable. Lint from the brake is set down as worth $15 per ton.

In a lecture before the Yorkshire Agricultural Association, Professor Johnston made some valuable remarks on flax, in the course of which he furnished the following analysis, which showed the nature of the substance which this plant derived from the soil.

	Heerstert, Courtrai District.	Escamaffles, Courtrai District.	Hamme, Antwerp District.	Holland.	Near Dublin
Potash,............	7.697	29.857	22.30	18.41	9.78
Soda,.............	19.186		14.12	10.95	7.70
Chloride of sodium,..	8.213	8.701	4.59	5.65	3.99
Lime,.............	15.379	16.483	18.33	18.37	12.53
Magnesia,..........	54.446	3.332	3.33	3.02	7.79
Oxide of iron,......	4.501	1.524	1.10	2.36	
Alumina,...........	0.444	0.438	0.72	1.44	6.08
Oxide of manganese,..	trace.	trace.	trace.		
Sulphuric acid,......	6.280	6.174	6.83	9.68	2.65
Phosphoric acid,.....	11.206	11.802	8.81	11.06	10.84
Carbonic acid,.......	20.599	25.235	16.38	13.75	16.95
	100.007	99.554	99.99	99.98	99.46
Per centage of ash,...	4.237	5.454	3.67	5.15	5.00

Professor Johnston, stated that using the seed and ball mixed, the exhaustion of the soil might be supplied, by means of the manure furnished by them when they were fed out to animals. In view of these facts he gave the following recipe to restore to the soil what had been taken from it by flax, viz:

Bone dust, (or bones dissolved in sulphuric acid,)...........	25 lbs.
Gypsum,..	10 lbs.
Pearl ash,..	20 lbs.
Soda ash, (dry,)...................................	20 lbs.
Slacked magnesia lime,.............................	20 lbs.
Or for the last, may be substituted crude sulphate of magnesia,	20 lbs.
And quick lime mixed with it,.........................	5 lbs.

150 lbs. of this, represents 150 of the ash of the plant, or 200 lbs. of the dry plant, say a ton of flax. An average crop is 800 lbs., or 6,400, (3 tons nearly,) flax plants, containing 320 lbs. of mineral matter; 4 to 6 cwt. of the above must be added to the land to supply the loss, or 3 cwt. and good half manuring. Many interesting facts relating to the raising of flax were also stated at the same meeting, which may be found in the Mark Lane Express, of August 9, 1847, from whence we have gathered the above. In Appendix 8 will be found a description of the Belgian Westphalian mode of raising flax, translated from the German, and which, it is believed, will repay the perusal.

In the Vienna Zeitung we find an interesting account of a communication made by Dr. Reissel, to the Society of Natural History, respecting the development of flax fibre and its connection with other spinning fibres, especially those of hemp and cotton, which we have translated as probably new to many of the readers of this report.—The fibre of flax, he says, as is well known, is the tissue of the inner bark of the common flax. It developes itself in the following manner. In the very early circumstances of the stalk, when the interval knots or joints first begin to form and the leaves are just unfolding, the whole stalk consists of nearly similarly formed cells, filled with chlorophyll and the four characteristic and variously formed layers of the developed stalk are not yet distinct from each other. By and by this separation and impression of the layers take place; these are formed by the rind or outer bark, the inner bark, the wood and marrow. The inner bark consists of three layers of very long cylindrical cells running in thin texture parallel to the direction of the stem. These are at first thin walled, and contain chlorophyll; by and by the chlorophyll dissolves; from the fluid contents is thrown down a solid secondary deposit upon the inner walls of the cell; then a second, third and fourth, so that the hollow of the cell is thus gradually lessened, and at last there is nothing more than a space left in comparison to the original one of ten to one. In this state, is the inner bark and with it the whole tissue of the inner bark of the stem is developed. The changes which the same undergoes from rotting, and the consequent separation undergone by the surrounding layers of the wood and the outer bark, as well in the preparation of linen as of paper are merely mechanical.

In the same manner as the flax fibre developes itself, so does that of the hemp. In a manner essentially analogous to this so far as relates to the secondary deposits on the inner wall is formed the cotton fibre. This, as is well known, is a seed hair of the cotton plant. The difference between the fibres of flax and cotton, is not very difficult to perceive by means of the microscope after some practice. The flax fibre has an uniform diameter, by means of re-agents; evidently easy for making many secondary deposits on the inner wall of the cells of the inner bark, and a very slight, often imperceptible space between these deposits. The cotton fibre on the contrary, exhibits a single deposit on the inner wall of the cell and a wider space of the same.

At the Chemico Agricultural Society of Ulster, in Ireland, a report was made of an analysis of the water of the river Lys, in Belgium, which is so celebrated for watering flax. Dr. Hodges showed that one gallon of it collected three hundred yards above the town of Coutrai, and from the middle of the stream contained nearly three grains of organic matter, which, when the water was evaporated to dryness exhaled a strong flax odor, and when the heat was increased, evolved ammonia. The water was rendered muddy by a flocculent matter which examined by a microscope magnifying two hundred and forty times, was found to consist of flax fibres and flax matter undergoing decomposition.

A species of plant (phormium tenax) has been recommended by Mr Poinsett, in De Bow's Commercial Review, as a product which may be useful to introduce into the south. It is obtained from Sidney and Van Dieman's Land, and is known by the name of the New Zealand flax. As described by McCulloch, he says it exceeds every other species in strength of fibre and whiteness.

It is thus mentioned in Captain Cook's voyage in 1775: "It grows in all places near the sea and considerably up the hills in bunches or tufts, bearing yellowish flowers, on a long stalk." Capt Wilkes also speaks in high terms of its capabilities, in his Narrative of the Exploring Expedition, and describes the native method of manufacturing it. According to the experiments of La Billadiere, Mr. Poinsett says, the fibre of this plant, is much stronger than any vegetable we know of; that of the agava Americana breaks under a weight of seven; that of flax eleven and three-fourths, that of hemp sixteen and three-fourths; that of the New Zealand flax, twenty-three and seven-elevenths, so that it is only exceeded by silk which reaches to twenty-four.

Mr. Poinsett expresses the opinion that it will succeed best in a rich swamp soil and says it may be propagated by the offsets which it throws out at the roots, but thinks it would produce seed in the southern country, which will afford a simple and easy way of propagating it. It has been found to be capable of bearing the winters in Ireland and south of England, and is quite naturalized in the south of France, where it bears seed. Loudon says that there are two kinds of the plant, the leaves of one are yellow, the other of deep red and both resembling the leaves of flags, and that the plant is found both on high and low ground, in dry mould and in deep bogs, but as it grows best in the latter, that seems to be its proper soil. Mr. Poinsett thinks it would succeed in the rich bottoms of the Mississippi valley. The imports of the article into England in 1831, amounted to 15,725 cwt.

TOBACCO.

There appears to have been for the last few years a decline of prices in tobacco and this with the increased demand for some other products has turned off the attention from the raising of this plant. It is believed therefore that the crop has lessened. There is more attention paid to it in some of the New England states, but the quantity grown there is too small to make any very sensible difference in the aggregate amount. The quantity per acre is probably considerably larger there than in the large tobacco growing states.

In the Albany Cultivator mention is made of some successful experiments in this culture in Massachusetts. The variety produced is known, says the account, as the "Connecticut seed leaf," and it usually brings double the price, or more, of the tobacco grown in Virginia or Kentucky. For a profitable crop rich land is necessary, though sandy soils manured at the rate of ten or twenty common two horse or oxen loads per acre, will produce well. With good management the yield is from fifteen hundred to two thousand pounds per acre, of marketable tobacco, at an average price of eight cents per pound. One gentleman is mentioned in South Hadley, who has seventeen acres.

The crop as managed by the growers in Massachusetts, it is said does not injure the soil, but on the other hand is rendered an ameliorating one. The liberal manuring applied, fits the soil admirably for other crops; and it is found that wheat and other grain and grass flourish better where tobacco forms a part of the rotation than where it does not. An instance is mentioned where thirty-six dollars' worth of manure was put upon an acre and one hundreds rods of land which was planted with tobacco. This raised a ton of tobacco, worth one hundred and sixty dollars. The land was then sowed to wheat and reaped thirty bushels. The next crop was hay which gave at two cuttings four tons.

The year 1847, is believed to have given some increase above that of 1845. In New York we have not before noted any, but we learn some attention is paid to it. One man in Onondaga county is mentioned who had ten acres of it which is said to have been very superior.

In Pennsylvania it is believed there was no great difference. The amount raised is only in small patches. It has, however, been introduced quite recently, into some portions of the state with marked success, not less than two thousand pounds being grown to an acre, worth ten cents per pound. The encouragement thus derived it is supposed will lead to the more extensive cultivation. The early prospect of the tobacco crop in Maryland was not favorable. One of the public journals in May last, remarks that many intelligent planters believe that not more than one-third of a crop of tobacco will be grown the present season. In a ride of twenty miles, the editor observes he judged not one hundred acres of the ground to be prepared for the crop; the high price of wheat, rye, oats and corn, leading the farmers to fill their land with these.

Since the crop has been gathered, Lyford's Commercial Journal gives the same reason for the light crop which had been realized. The whole Maryland crop is there estimated at about twenty thousand hogsheads.

Another, an agricultural journal, at an earlier date remarks that there was not as much ground appropriated to the tobacco crop as in former years, and conjectures that there could not be more than as large a crop as that of last year.

The tobacco worm was the subject of complaint in a portion of the tobacco growing region. One journal speaking of its ravages in the vicinity, says that some of the fields were literally stript by them, and the tobacco was hardly worth the housing. This worm is said by an observant planter to have been on the increase for several years, and that should it continue on a few years it will be impossible to check their progress.

The crop of tobacco is stated to be probably below even the low estimates made, and much in the field was not worth the cutting.

There is a slight diversity in the reports which we have received respecting the tobacco crop in Virginia. In a few instances it is thought to have been somewhat better than in 1845. The crop of that year it will be recollected was a decrease of the crop of the previous year. The same causes which operated to reduce the quantity of acres planted in Maryland, seem likewise to have exerted an influence in this state, and for the most part there has been a decrease in the product. We have referred again to the census returns and re-examined our former estimates, and thus endeavored to form something like a suitable decision approximating to accuracy respecting it. This too is the more desirable as Virginia holds such a prominent place among the tobacco growing states.

One of our correspondents residing in the tobacco region of Virginia says, the crop of 1845 was a good one in quality. The crop of 1846 was of inferior quality, and I learn, 52,000 hogsheads, at an average of 1,150 pounds the hogshead. The crop of the current year will be in the market in 1848, and will be far short of the two preceding years; the western states have grown for several years large crops of tobacco, which, together with the crops in the Atlantic states, has given a supply of the article greatly beyond the demand in the foreign markets; that, with the reduced price and the enhanced price of corn, determined our planters to abridge their tobacco crop from one-fourth to one-third less, so that I estimate the crop as low as 40,000 hogsheads.

The aspect of the crop in North Carolina was much the same as in Virginia, but owing to the severe drought in this state in 1845, and the consequent large deduction made then in the tobacco crop, this fact must be kept in view in determining the probable amount of the crop of 1847. The decrease on this account, even if allowed to be some twenty or twenty-five per cent. from an average one, would yet bring it much nearer to that of

1845, or at least diminish it less than if that year had been a favorable one. From similar reasons we have likewise formed our estimate of the crop of South Carolina, but as the quantity raised is so small, this will exercise very little influence on the general result.

In Georgia, Alabama, and Mississippi, there may have been an increased product per acre, but the attention of the planters has been so much turned to other and more important crops, that comparatively little can be ascertained respecting it.

In Tennessee and Kentucky as far as respects the influence of the weather we believe the crop prospered. As the crop of 1845 was noticed as unfavorable in Kentucky, which then stood foremost among the tobacco growing states, we doubt whether, even with the attention more turned to other crops, the tobacco crop did not advance upon that of 1845. In portions, however, of the state, there was unquestionably some falling off.

In Ohio there was less land devoted to this product this year, and the whole crop of this state is estimated at from about 6000 to 8000 hogsheads. In Indiana and Illinois there would appear to have been a slight increase in some portions, while in others it fell off at about the same rate.

The tobacco crop of Missouri is one of some importance, and it is believed succeeded as well as usual. The culture of this plant is increasing in Florida, and although the quantity raised in this state is but small, yet it would seem probable that the attention will be gradually turned toward it, and on soils such as are there most favorable to its growth, the best qualities of Cuba tobacco will be cultivated with increasing success.

In the report before the last, the estimate for Louisiana was omitted from the column on account of the difficulty of ascertaining respecting it. The amount raised is small, but it has been thought best to restore it after referring to the census and such other information as we could command.

Some allowance must be made in regard to this crop from the accounts of the inspection and of sales for home consumption, in estimating the whole product of the crop. There is no doubt a considerable quantity thus used in the states where it is raised, which does not appear in those important means of information to the public respecting the stock disposed of and still on hand in the market.

We have subjoined in an Appendix No. 9, an account of the method of raising tobacco in Cuba, which is stated to be considered of such value that it is forbidden to be sent from the island. It was however procured, translated, and published in one of the southern States. Whether or not this statement may be correct, it is believed to be a valuable document for tobacco growers, and as it does not seem to have been very extensively disseminated, it is judged suitable to add it to this report.

The seed of some varieties of Hungarian tobacco were furnished to this office by Mr. Fleischmann, which have been planted and found to be remarkably hardy, and the produce will be distributed among the other seeds, which will be sent to the members of congress, &c., from this office this season. It is hoped that benefit may thus result from the introduction of these plants, before unknown to our tobacco growers, even should they not prove of the finer kinds.

In one of the New Orleans journals we have a notice of an experiment with the seed of a variety brought from Turkey, which is said to have been very successful. A quarter of an acre was planted with it. The product is mentioned as being a very superior article in appearance and quality, and with a little more than ordinary attention amounted to four times the quantity that is usually yielded by the same extent of land.

The following experiment respecting the curing of tobacco, which is taken from the Southern Planter, shows that fire-curing is not necessary, but that it may be cured in the shade to equal advantage:

"Two hundred plants, all as nearly alike as to quality and size as could be discerned by the eye, were divided into two parcels—each of 100 plants, while green—200 lbs. each, and hung on sticks and suffered to remain on a scaffold three days. Then one parcel was put in the barn and fire-cured; the other into a house where there was no fire, and suffered to remain about five days, when it was perfectly cured. They were then both stripped and weighed. The fire-cured weighed twenty-five pounds—the shade-cured thirty-two pounds—being a difference of twenty-eight per cent. in favor of the shade-cured. On examination of the inspectors and buyers, there was no material difference between them."

The consumption of tobacco is large in foreign countries, as well as in our own. The contract for the French government recently taken amounts to nearly 10,000,000 kilograms, or about 22,000,000 lbs.

According to official returns, Great Britain consumed in 1846, 26,557,000 pounds.

COTTON.

Notwithstanding the importance of this crop, and the great attention paid to its progress in the southern journals generally, it is one of the most difficult of all the crops to estimate at the period at which the report of this office is prepared. The picking continues so late that it is impossible to embody the entire results within the year.

There are also numerous influences which operate to modify the estimates which are from time to time published in the different commercial ports, so that they are extremely contradictory. Such, too, are the views of the planters themselves as to their own immediate vicinity, and the amount which may be anticipated.

We have watched the progress, so far as was practicable, and availed ourselves of such means as were in our power to get the proper information, and have made an estimate accordingly. We do not consider it advisable, however, to enter into details, as it would be but the placing on our pages various extracts from the public journals for which we have not room.

The two principal *evils* to which it is subject, are the *worm*and *unfavorable season.* There has been some complaint respecting the cotton worm in the early part of the season, and fears, greater perhaps than were realized, were expressed as to its effect on the coming crop. It is said there are three or four species of worms which pass under this name.

Two of them are ground worms—one a gray cut-worm, and the other a large black and yellow striped worm, which feeds on both the leaf and stem. All of them, however, and the boll worm included, are considered as not to be dreaded in comparison with the cotton caterpillar called *noctua gossypii.* The amount of cotton raised by all the other states, except North and South Carolina, Georgia, and Alabama, Mississippi, Louisiana, and Tennessee, is so small as to exercise but very little influence on the crop.

Beginning with South Carolina, we wish first to correct an error into which we have been led by some former correspondent respecting the cotton crop of this state, and for a notice of which we are indebted to the kindness of J. H. Davis, corresponding secretary of an agricultural society.

He gives the exports of the last crop (1846) at 330,000 bags, or about 115,000,000 pounds. "Some of this," he says, "may have been from the states of North Carolina and Georgia; if so, the amount cannot be very great—not greater perhaps than our domestic consumption."

On reference to the census returns, which were but 61,000,000 lbs., we believe this estimate of his must be considered too high; but we place it higher than ever before. Though there is some diversity in respect to the crop of 1847, as compared with that of 1845, yet it is believed on the whole to have been better. Most of the accounts we have, so consider it. Some fix the increase as high as fifty per cent., and others vary from ten per cent. and more, upwards. The drought of the summer of 1845 is the reason assigned. Although the rains in the early part of the season in 1847 proved somewhat injurious, yet the weather for the gathering was most favorable. We are inclined to believe, therefore, that the crop was fully equal to that of 1846, as above given by an intelligent correspondent.

The information given of the cotton crop of Georgia and Alabama, in the early part of the season, and even during the month of September, was discouraging.

Thus, under date of September 8th, we find a communication in the Alabama Planter, of a gentleman who speaks of having travelled over a large extent of country, embracing Dallas, Lowndes, Perry and Autauga counties, and who says: "With the exception of a few days in the early part of August, we have had heavy and continued rains, up to this time, which have done considerable injury to the cotton crop, causing an overflow at different times of the low lands adjacent to the creeks, and the cotton plant to grow to an immense weed. The lower bolls, shaded by the thick foliage above, and exempted from the favorable influence of a hot sun, rot and fall to the ground, only maturing on branches exposed to the air, touched occasionally by rays of the sun. The high lands would have made a fair yield, but for the appearance of the boll worm, which have extended their ravnges to a fearful extent, sparing no fields, but as destructive on the low prairie swamp and cane brake lands as was ever known by any of our oldest planters." He closes this letter by saying: "In view then of the heavy rains of the season, the lateness of the spring, the backwardness of the crop, the destruction caused by the boll worm, the great deficiency of grown bolls left on the plant to mature, who can doubt but that the receipts at Mobile will show another short crop, perhaps shorter than that of last year."

Another letter, in the same journal, from Georgia, under date of September 24, thus speaks: "Throughout the counties of Troup, Harris, Talbot, Muscogee, Meriwether and Upson, (six of the largest producing counties in the state,) the heavy rains of the summer caused the forms to drop off, and, since the middle of August, the caterpillar and boll worm have both commenced a struggle to destroy the plant."

In October and November the prospect brightened, and we find, in the same journal, encouraging accounts. Thus it is said, October 4th: "The weather generally continues highly favorable for cotton, and we doubt not, that under the influence of a bright, hot sun, the bolls are rapidly maturing and opening. Yet we cannot flatter ourselves that the yield will be any thing like an average crop."

Again, October 25: "The weather continues highly favorable for cotton, and we hear from all sections increased estimates of the receipts at this port," (Mobile.)

"We are satisfied, ourselves, that the Mobile crop will considerably exceed the estimates made a month ago, still not to the extent fixed by many."

In the same journal, November 15, we find the following: "The Marion Review says, it is now the fourth of November, and there has been no frost sufficient to kill vegetation. This is exerting a most favorable influence on the cotton crop, in maturing what the planters call the *top crop*, and enabling them to save their staple free from trash and unsoiled by rains. Should this weather continue much longer, the yield in Perry will not fall very short of an average one." The receipts at the port of Mobile, up to the 31st of December, 1847, exceeded those of the previous year (1846,) 17,432 bales, which would seem to indicate that the crop was equal, if not superior to that of the former year. We believe, therefore, that these states will be found to furnish their full supply of the whole cotton crop, as there seems to have been more planted than before.

The crops of Mississippi and Louisiana seem also to have suffered some of the evils which have already been mentioned in respect to Georgia and Alabama. A correspondent of an agricultural journal, speaking of these states, remarks: "If the boll and army worm had not operated, the south-western crop would have been the greatest ever made." He places the whole crop at 2,200,000 bales, and says that the upland will be short, but that grown on the bottom lands good. Under date of October 24th, we find it stated: "Except one rain there has been no loss of cotton or time, and far more up to date than for some few years. We have not had one for twenty-six days, from the 22d of September to 23d of October." Thus far the crop shows better. In November, also, it is stated: "Except the falls of 1830 and 1839, I do not remember so good a one as the present. I have not lost three days since I began to pick." The author complains of much cotton being wasted in the wilds. M. W. Phillips, Esq., in a letter to this office, fixes the Mississippi crop at a fair share of 1,150,000 bales, which he estimates for the receipts at New Orleans. It would appear that Mississippi grows full half, and probably more than the whole receipts at New Orleans.

The cotton crop of Louisiana appears to have been a good one, much better than in 1846, which was much injured by the caterpillar and army worm, and fully equal, probably somewhat better, than that of 1845. Those of Tennessee and Florida are also believed to have been fully equal to the average crop. It would appear, if we may judge from the receipts at New Orleans up to the close of the year 1847, that it was fully equal probably to that of 1846.

We are inclined to place the crop, from the best information we can gather, at about 2,250,000 bales, at least we should judge that it must average two million two hundred thousand, the estimate of one of our correspondents. Some place it much lower, and others, again, set it at two million three hundred and fifty thousand bales, or even still higher. The fact must be taken into consideration that more than usual has been planted, the weather for gathering has been most favorable, and the state of the market has been such as not yet to call into the shipping ports in all cases the due proportion of the crop.

Various *species* of cotton have been mentioned in the papers as promising advantages to the cotton grower. Among those which makes the most pretensions is the mastodon cotton, which while it is extolled by some, is as much depreciated by others. Perhaps experiments sufficiently extensive have not been made, through a course of years, so as to determine its value as compared with other kinds. The principal introducer of it, complains that many persons have been imposed upon by an imitation, and have found it worthless. He claims that the produce is larger, that it also affords a finer staple, and thus is much more remunerative than other kinds. The controversy on the subject may be found in the various agricultural papers which treat of southern products.

The seed of the cotton has been often recommended as valuable for the purposes of oil, and also for manure. It is said, that thirty pounds of cotton will give one bushel of seed, from which may be obtained two quarts of oil good for burning. As a manure, also, it is stated to be peculiarly valuable for the cottoncrop.

The attempts of the English to raise a competition of cotton grown in India, has hitherto been unsuccessful. There seems some reason to believe that cotton may yet be cultivated in Turkey, and possibly in some parts of Africa; but many years must elapse, even should these attempts be successful before any competition can be feared from these parts of the world to our own cotton growing states.

The cultivation will doubtless increase in Texas and Mexico, should the latter country at last begin to experience the greater influences of industrious efforts which may develope her agricultural and other resources

RICE.

The amount of this crop is determined principally by the success or failure of its growth in South Carolina.

The history of its progress has been furnished us by an intelligent planter who devotes his attention to this business. He remarks "the month of April to the 15th of May is the season for planting. The monthly tides were unusually high this year. The months of June, July, August, to the 15th of September, were excessively rainy; the corresponding months in 1845 were excessively dry, the woods were on fire in July and August. From the middle of September to 20th of November, there was but one rain of any consequence. The barometer showed unusually little variation throughout, ranging well up generally, and more recently very high. In August the planters on the long rivers were visited by a freshet which sensibly diminished the crops. The crop of 1845 was about 112,000 barrels; it was diminished by drought and the effect of salt water." The crop of 1847 he puts as about 130,000 barrels allowing 600 lbs. nett to a barrel, it being slightly lessened by the August freshet.

Individuals suffered severely but the general average was made up by the heavy crops below.

The crop of 1846 was about 146,000 barrels. It is generally harvested in the month of September.

The crop of 1847 therefore was probably some per cent. more than that of 1845. This we believe also was the case in the other states where this product is grown, and have fixed it accordingly.

Among the *varieties* of rice is the gold seed rice, so called from its bright yellow color. Of this there are two sizes,—the long grain which was introduced a few years since, and which has since been cultivated with great success, and the old fashioned common sized small grain rice—the difference is in the length of the grain, not in its breadth. The new seed was tried by some planters but unsuccessfully, owing to the want of attention to it. Several experiments were tried to determine the truth respecting it as follows:

In 1845, Col. Ward (the introducer of this variety) had a field of 16 acres sown equally with the long grain and the other kind in alternate beds. They were treated also exactly alike whilst growing; when ripe each of them was harvested, threshed and cleaned separately, and the result was as follows:

No. 1.	Rough Rice.	Clean Rice.		Small Rice.	Flour.
Long grain	376 bushels =	10,754 lbs. =	$404.67 +	$5\frac{19}{32}$ bush.	[illegible]1 bush.
Small grain.	348 " =	10,767 " =	404.56 +	$5\frac{35}{32}$ "	[illegible]3 "

Again in 1846, Dr. E. T. Hewitt planted a field of 25 acres, sowing each bed alternately as in the former experiment. They were heated alike, harvested, threshed and cleaned separately, and their results are thus given:

No. 2.	Rough Rice.	Clean Rice.		Small Rice.	Flour.
Long grain	392 bushels =	12,099 lbs. nett =	$547.62 +	$4\frac{3}{4}$ +	$40\frac{1}{2}$ bush.
Small grain	381 " =	11,065 " " =	$493.96 +	$5\frac{1}{4}$ +	37 "

The cultivation of rice in Alabama especially in the marsh lands near Mobile bay are highly recommended in the Alabama Planter. The writer of the article on this subject says that the lands there possess the essential things which are requisite for its success, richness and capability of being made dry or irrigated on account of its being level, and that in every respect they possess advantages equal to any in the United States for the purpose.

The introduction of rice in this country is said to have been owing to one of those trivial occurrences which often exert a powerful influence on a nation's prosperity. It is stated that in the year 1695, a brig from Madagascar, touching at Charleston on her way to England, anchored off Sullivan's Island. The captain invited *Landgrave Smith* on board and presented to him a bag of seed rice, with information of its growth in the east, and its excellence for food and its amazing increase. The governor divided it among his friends, who made experiments with it, which fully answered expectation, and from this small beginning arose one of the great staple articles of South Carolina and Georgia.

The mode of irrigation of rice in China is thus described in Fortune's China, a work which contains many interesting particulars relating to Chinese agriculture:

"*Irrigation in China.*—Rice is grown on the lower terrace ground; and a stream of water is always led from some ravine and made to flow across the sides of the hills, until it reaches the highest terrace, into which it flows, and floods the whole of the level space. When the water rises three or four inches in height, which is sufficiently high for the rice, it finds vent at an opening made for the purpose in the bank, through which it flows into the terrace below, which it floods in the same manner, and soon to the lowest. In this way the whole of the rice terraces are kept flooded continually, until the stalks of the crops assume a yellow ripening hue; when the water being no longer required, is turned back into its natural channel, or led to a different part of the hill for the nourishment of other crops. These mountain streams which abound in all parts of the hilly districts, are of the greatest importance to the farmer; and as they generally spring from a high elevation in the ravines, they can be conducted at pleasure over all the lower parts of the hills. No operation in agriculture gives him and his laborers more pleasure than leading these streams of water from one place to another, and making them subservient to their purposes. In my travels in the country the inhabitants often called my attention to this branch of their operations; and I pleased them much when I expressed my admiration at the skill with which they executed it. The practice is not confined to the paddy-fields; for I remember once, when superintending the planting of some large trees and shrubs in the garden of Messrs. Dent and Co., in Hong-Kong, after I had given them a large supply of water at the time they were put into the ground, I desired the gardener to repeat the dose next morning. But on the following day, when I returned to the spot, I was surprised to find a little stream divided into many branches, and meandering among the roots of the newly planted trees. As there was no stream there before, I went to examine its source, and found that it had been led from a neighboring ravine—a work more easy than carrying a large supply of water in buckets, at the same time more effectual."

Mention was made in one of the former reports of this office, respecting a species of rice which is found in the north-western parts of the United States. Since then it has been further noticed as abundant in the Minnesota Territory. Gen. Verplanck, late Commissioner to the Chippewa Indians, pronounces it better than southern rice. The kernels are larger and its flavor is better; for when boiled and stewed, and left to cool, it forms a consistent mass like good wheat bread, and more nutritious. It is stated that very great quantities grow on all the lakes in this northern country. The outlets and bays are filled with it. It ripens in the month of August, and is the main reliance of the Indians, during the winter months, for their sustenance. From this account it would seem that it might be an article worthy of attention, and that possibly it may become known and used in the more eastern states.

Some successful efforts have been made recently in France, to cultivate rice; but the experiments have not as yet been made on a sufficiently extensive scale to warrant any conclusions as to the probability of its exercising any important bearing on the question of subsistence which is so earnestly agitated in that country.

SILK.

With respect to this article, we are much at a loss what to say. We believe it is undoubtedly on the increase in many of our states, and especially in the New England states, in New York, Pennsylvania, and somewhat more attended to in certain of the western and southern states. But the extent of its cultivation is as yet so small compared to many other crops, that it is extremely difficult to form any estimates respecting it. The efforts which are made by our silk growers in this country to attain increased perfection, are encouragingly successful. Some of the articles exhibited at the large fairs and in the rooms of various agricultural societies, do great credit to those who have furnished them. The manufacture of fabrics of domestic silk has shown what might be done were the energies of our people once turned in a higher degree towards this object.

Additional information has likewise been published. Some interesting and valuable treatises from the French have been translated, including one from the Chinese, giving an account of their method of managing their worms. The great points to be aimed at among us, seem to be to convince the people that it is a business which will remunerate for the time and trouble and expense of attending to it. For this purpose it is necessary that the trees best adapted to the climate and soil of the particular section of country should be selected. One great error which has been committed probably has been using the same species of mulberry for all the various sections of the country. The morus multicaulis was thus tried, and in consequence of not being able to stand the severity of the northern winters, was discredited, and not merely so, but likewise by its failure produced a reaction against the business. There was not enough of sober and considerate management among its advocates, and in consequence of the disappointment of a spirit of excited speculation, the whole business was pronounced chimerical. But there was great want of discrimination in the utterance of this verdict. Though the morus multicaulis may not succeed amid the frosts and snows of the north, it may do so in the more genial climate of the south, and some other hardier variety may do for the north. Because, too, men have injudiciously urged on their speculations and became losers, it by no means proves that a more rational method of aiming at its cultivation might not ultimately be crowned with complete success. Indeed, from the experiments which have been made in such a manner, we can augur the most undoubted encouragement.

Another point of importance is the selection of the right kind of worm. We have heretofore, in our former reports, furnished extracts from those periodicals which are most devoted to this subject, and from a variety of works which contain information relative to the characteristics of the different species which are employed.

Many of the questions which have been raised respecting the best methods of feeding have been decided, and with a little attention to the best sources of information scarcely any one can be at a loss on the subject. The New York Farmer and Mechanic has had its columns supplied with much valuable original and selected matter on this topic, by that practical silk-culturist, Mr. Van Epps, who has devoted much time and attention to all the particulars which fall within the cognizance of this important business. We do not propose to repeat any of the former details on this subject. All that will be necessary will be simply to add any thing that may seem more new and important.

A great difficulty in raising silk worms has been the prevalance of the disease called the *muscardine.* To remedy this evil, the attention of many has been directed. An interesting course of experiments in reference to it, has been published in the Journal d'Agriculture Pratique et de Jardinage. The views taken there by Guerin Meneville are the following:

1. The muscardine is a contagious disease produced in silk worms and other insects by the vegetation of a cryptogamous plant of the class of moulds discovered by Bassi, and named *botrytis bassianna.*

2. This plant cannot develope itself in the body of living insects which are very sound and vigorous. It is propagated by its grains or sporules,

which are deposited on other silk worms or other insects by immediate contact or by means of the air.

3. When these grains fall on a silk worm they are probably absorbed by the pores of its skin or by its organ of respiration, and thus penetrate into the body. The germination or incubation of those grains is much more rapid than the growth of the silk worm. Thus for example, six or eight days are sufficient in the fifth stage, to produce death in worms which are artificially infected.

4. In the more ordinary cases, twenty to twenty-four hours after its death, the worm has a rosy tint more or less intense and becomes more and more hard. In twenty-four hours more, following the temperature, it begins to whiten slightly by the first shooting forth of the cryptogamous plant.

5. From this point of time, the branches of the fingers rapidly increases and the silk worm becomes more and more white. The plant flowers, if we may call it so, and at the hundredth hour it is in full fructification. The sporules detach themselves on the slightest touch, or at the least breath; then it is only that the worm whitens the fingers like chalk.

6. These grains or sporules are so small, the diameter of five of them only fills the hundredth part of a millimetre; they are spherical and as white as snow, rise in the air like an impalpable powder, or better like a light smoke scarcely visible.

7. The worms on which the muscardine seed is blown, present no sign of the disease; they eat with the same eagerness and die suddenly without being wasted or discolored. The same is the case when they are inoculated.

8. If a worm of the fourth or fifth stage is inoculated with the fat of a worm which has died by muscardine, but which presents no whitened vegetation as yet, the worm more suddenly dies according to our experience in about two days, in that case it is indeed a plantation of vegetable shoots.

9. Worms affected with other diseases do not die from the muscardine when the muscardine seed is thrown on them. In this case it seems to be inappropriate to its vegetation, and when they yield to their disease they remain as usual, and soon become putrefied.

10. From the foregoing, it seems to follow that the muscardine, as has hitherto been believed, is owing to the bad state of the frames or to a great accumulation of worms. This disease consequently has no analogy with the typhus and other contagious or epidemic maladies, of which the cause is at present so little known, at least it results from parasites as was suspected long ago, by the immortal Linnæus.

11. As for the atmospheric causes to which are so readily attributed all kinds of epidemic, they play no other part in the production of the muscardine than they usually sustain in analogous diseases. We cannot therefore give them seriously as a specific explanation.

12. Worms that die of muscardine, do not communicate the disease to other worms, except when the vegetable substance which covers them and renders them entirely white, is only in the germ (50 to 55 hours after the death of the worms.) They communicate the disease with great energy.

13. It is frequently the case that the worms dead from the muscardine and covered with a vegetable substance yet in the germ, rapidly dry up. Then the botrytis cannot ripen and yield its seed. The worm remains dry and white; but it does not whiten the fingers and cannot communicate the disease.

14. It is very probable that the seed of the muscardine is preserved in the frames infected, even in those which are best kept, by the worms which die after they have mounted on the twigs. In cocooning when the cocoons are carried away, those which are whitened of which the seed has had time to ripen and which remain resting on the twigs, disperse a cloud of powder or sporules, which preserve the principle of the evil for next year.

15. To a similar cause may be attributed the infection of whole villages and countries. As every one throws the twigs from the frames out of the windows, sweeps the infected chamber, and raises a dust, it is certain that numerous seeds of the fungus are borne away by the winds and transmit the disease to great distances.

16. Moisture in the cocooneries increase the chances of infection in forming the flower, and especially the fructification of the botrytis.

17. If we take into the midst of a cocoonery (infected) worms raised till the fifth stage in a healthy place, those worms begin by presenting instances of muscardine at the end of seven or eight days.

18. If we take worms from an infected cocoonery to transfer them into a cocoonery which has never had the muscardine, this discease will not be stopped, but the mortality continues always increasing. * * * *

We believe that the muscardine might well be a spontaneous existence, or that it is not produced solely by the want of care in training them; that it is not given to the worms by the mouldiness of their litter, by the accumulation of the worms by want of air in the cocoons, &c. It is on the contrary sown on the silk worm in the country where the culture of that insect is carried on, on a large scale; just like other diseases which appear in countries where they have not been known, where certain vegetables are cultivated in proportions that are contrary to the view of primitive nature.

We by no means would imply that the want of care respecting health, cleanliness and ventilation of the cocooneries are things indifferent; but we think that these ill-suited conditions, that give to silk worms many other very disastrous diseases, have not any influence on the invasion of the muscardine; or that if they have any such, it is simply to increase its ravages, in preserving in the frame the dead individuals which soon furnish seed capable of infecting the worms which have escaped up to the moment of the attacks of the epidemic.

Much is to be done doubtless to attain the end proposed, of finding means of preserving our frames from this plague. Among the means of prevention recommended we notice burning liquid tar morning and evening in the room where the cocoonery is infected. During storms burn it constantly.

As a cure—one gramme of fluid chloride of lime, carbonate of soda twelve grammes, calcined alum sixteen grammes, in five litres of water, is a receipt said to be excellent for the purpose.

The disease above mentioned does not seem to have prevailed so greatly in our country as in Europe. Still it does not seem amiss to know how much injury may be done by its ravages, their nature and the means of preventing or remedying the evil.

Several very interesting treatises or papers on the culture of silk worms might very appositely find a place in our appendix did our room allow. We can, however, only insert that of Mr. Byram, and which a very competent judge says is just the thing that is wanted. It is clear and simple, yet practical, and in a small compass embodies much valuable information. We may, however, subjoin some papers relating to the silk culture should our space allow.

The Chinese mode of managing silk worms, their varieties, as also of the mulberry, with the peculiar varieties of each, may likewise be found described in a volume of M. Julien; portions or rather a summary of which may be found in the New York Farmer and Mechanic. We should at once transfer some of these articles to our pages but for fear that our limited space will not allow of it, we can therefore only recommend it as containing much that is both valuable and interesting.

To show the progress of the production of this article in England—it is said to be a well known fact that a pair of silk stockings presented to Queen Elizabeth was worth their weight in gold. Now, however, Mr. McCulloch estimates the consumption of silk stockings and gloves, simply, annually, to be £2,500,000, equal to 10 or $12,000,000.

In forming our estimates of the crop for 1847, we have gone back to the census returns, and have corrected them by that basis. We have somewhat reduced the aggregate, though we believe there has been some increase nett, we think the estimate of 1845 may have been too high.

SUGAR.

This is a crop which, so far as regards that made from the cane, is almost confined to Louisiana, and hence it might seem an easy matter to form an estimate of the amount, and it would be so, were the result known early enough to be embraced in our report. But the process of manufacture is going on during the last month we are forming our estimates, and the entire results are not reached till after our estimates have been made. We think, however, from all the information we have been able to gather, that the crop has been a good one, and the product is large. The New Orleans Delta, in December, says that "the crop of sugar in Louisiana, it is estimated by competent judges, will exceed the crop of last year by at least *one hundred thousand* hogsheads. The quantity of molasses of this crop will even exceed that of the sugar as compared with the product of last year. Notwithstanding the unfavorableness of the weather, the extensive character of the crops, and the fullness of the cane, throughout the state, will fully justify the calculation of the produce of the season. The crop of 1846, it is ascertained, was about one hundred and forty thousand hogsheads. "Two hundred and forty thousand," it is stated, "is an estimate which no one regards as extravagant. At the rate of fifty dollars per hogshead, this will give the sum of twelve million dollars, the value of a single product of twenty-three parishes in this state."

Of these parishes there are, however, but fourteen in which sugar is a leading or principal product. Deducting about two millions for the value of sugar produced in the others, there are fourteen parishes which produce ten million dollars' worth of sugar.—The fact is also noticed that the idea is now exploded which considered that sugar could only be produced on alluvial soil. The experiment has been tried, and most successfully, on the high grounds back of Baton Rouge and above Bayou Sara, and still higher up on the Red river. The large increase of the sugar crop, among other things, is doubtless owing to the improvements which have been made in the methods of manufacture.

The attention of individuals, also, in Georgia, Alabama and Florida, is turning somewhat more towards sugar as a product that may be cultivated to greater extent in those states. Texas will, however, eventually be the greatest rival of Louisiana in the cultivation.

A variety of interesting particulars respecting the cultivation and manufacture of sugar might be quoted, but as there is not space to do them any justice, we would refer to De Bow's Commercial Review as containing many things on this subject worthy of perusal. The December number for 1847 is peculiarly valuable for this purpose.

It will be recollected that the last report (1845,) contained a letter from J. Balestier, Esq., U. S. Consul at Singapore, giving an account of the Chinese mode of cultivating sugar. Since that time a letter has been received from the same gentleman, in which, alluding to the former one, he says: "Since communicating to you the Chinese mode of forcing the development of sugar cane plants, by close packing in a pit, as formerly described in my communication, it has often appeared to me to be particularly well adapted to the circumstances of Louisiana, where, owing to the climate, the planting of the cane is late, in consequence of which it scarcely comes to maturity when the approach of the cold season obliges it to be cut. By the Chinese mode, would it not be practicable to pack the plants in the manner indicated in the autumn, and then keep them covered over, unexposed to the frost through the winter, during the period of which they would slowly vegetate, and in the spring be found ready for planting, advanced at least one month over other plants not so treated; the effect of which would be to give the cane more ripening? If this mode is not already in practice, it would certainly do no harm to bring it before the public."

The suggestions seem to be worthy of attention, and it might be well for our sugar planters, if they have not done so, to make the experiment. Possibly much benefit might result from the course recommended.

The steady advance in improvement of Louisiana, affords encouragement to believe, that the time may not be far distant, when this state, aided by Florida and Texas, will be able to furnish enough to meet all the demands for consumption of this article in the United States. This would be a very desirable consummation, not merely on account of the growing prosperity of this state, but as occasioning still increased exchange of products from other states.

The following we take from the New Orleans Price Current, of September 1, 1847, as the amount of the crops of this state for many years past:—

Crop of	1828	88,000	hhds.
"	1829	48,000	"
"	1832	70,000	"
"	1833	75,000	"
"	1834	100,000	"
"	1835	30,000	"
"	1836	70,000	"
"	1837	65,000	"
"	1838	70,000	"
"	1839	115,000	"
"	1840	87,000	"
"	1841	90,000	"
"	1842	140,000	"

Crop of 1843	100,000 hhds
“ 1844	200,000 “
“ 1845	186,000 “
“ 1846	200,000 “
We add 1847	240,000 “

The production and consumption of sugar is large. In 1844, the [illegible] amount produced from all the sugar growing countries in the world w[illegible] down at 778,000 tons, of which 200,000 was supplied by Cuba alone. It is probable that by this time, therefore, it can scarcely be less than 850 to 900,000 tons, if we include beet and maple sugar. It is estimated that Great Britain consumes as much as 250,000 tons, the rest of Europe 450,000, the United States 150 to 160,000 tons, or more; Canada and the other British Colonies, 25,000 tons.

The amount of *beet root sugar* made in France in 1846–1847, was estimated at 107,190,110 pounds, being an increase of 26,596,432 pounds on the quantity manufactured the previous year. This article shows the importance of perseverance in such experiments as hold out the probability of success. It is well known, as a fact of history, that the origin of this manufacture as a national one, sprung from the necessities of the French people, when in their wars, they were cut off from the usual supplies of cane sugar by the West Indies. It is not less, too, a matter of record, how great was the ridicule cast upon the Emperor Napoleon for his efforts by way of encouragement to this business.

But the best science of that scientific nation was brought to bear upon it,—one difficulty after another disappeared and now it has become a constantly enlarging and lucrative branch of industry, not only supplying the means of livelihood to multitudes, but in a measure, relieving the whole realm from dependence on foreign nations for this useful article of subsistence and luxury. Were equal industry and science applied in this country, either to the manufacture of beet or corn stalk sugar it is believed that the most important results might be effected. In some future years very probably such may be the case.

We have not been able to learn of any experiments recently, in reference to the latter article. As this year was so fine a one for the growth of the corn crop, had there been attention given to experiments respecting maize sugar, it is not improbable that they might have been crowned with success. But so long as incredulity bars out effort, or rather there is no immediate necessity to aid in overcoming it, but little can be expected. Yet the success of the first crude trials which have been made, has been fully equal to that of the earliest attempts respecting the manufacture of the beet sugar, and enough to warrant the sanguine expectations. That a syrup or molasses can be made from the corn stalk, seems to be readily admitted. That sugar has been made is equally certain; that it may become a profitable object for the agriculturist will doubtless be demonstrated, when a more determined effort has been made to remove the difficulties and overcome the obstacles which have hitherto impeded the graining of the syrup.

Much encouragement might be drawn also from the improvement which has taken place in the manufacture of *maple sugar*. It is but a few years since the highest reach of art in this manufacture produced only a fine muscovado-like sugar, and now by the improved processes, specimens are annually exhibited at the agricultural fairs, vying with the most beautiful loaf sugar. This has been effected by greater attention to cleanliness in the preparation of the sap, and the improvements in the methods of graining and refining the sugar.

Different methods have heretofore been given as employed by individuals to whom premiums have been awarded for the best manufactured maple sugar. We subjoin one of the most recent, furnished by S. Tinker of Richland, Oswego county, New York, to whom was given the premium of the county society, September last:

The sap is boiled in a potash and cauldron kettle, to a thick syrup,—strain it when warm—let it stand twenty-four hours to settle, then pour it off, heaving back all that is impure.

To clarify fifty pounds, take one quart of milk, one ounce of saleratus and the whites of two eggs, well mixed; boil it again until hard enough to lay upon a saucer, then let it stand in the kettle and cool. Stir it very little to keep it from caking in the kettle.

For draining, use a tube, tunnel-shaped, say fifteen inches square at the top, and coming to a point at the bottom.

Put in your sugar when cold, tap it at the bottom and keep a flannel cloth damp on the top, two or three thicknesses.

When drained, dissolve the sugar in pure warm water, and clarify and drain as before.

There is considerable difficulty in estimating the amount of maple sugar produced. One or two considerations, however, deserve weight in addition to the character of the season which always exercises a very important influence on the subject. In most of the older states the increased cutting of timber will tend yearly to lessen the amount. This, too, may operate to a less extent in the older of the new states in the west, as parts of Ohio and Indiana. So far, therefore, as this effect may have any influence we should naturally look for the most decided increase in a very favorable way in the most recently settled states.

Another thing to be regarded is the comparative low price of imported sugar. When foreign sugar is high, or when there is a short crop abroad, there will naturally be a greater attention paid to the maple sugar as a supply of the deficiency. When it can be procured, however, in large quantities, and at a low price, the need of the manufacture of another article at home will not be felt. At present the price of sugar is comparatively low, and we are led to believe, from the information furnished us, that less attention has been paid than usual to the production of maple sugar even in those states where it has been hitherto most abundant. In some sections of the country, also, there is considerable complaint of the badness of the season—while in others the alternate freezing and thawing is assigned as a reason for the greater productiveness of this crop.

On the whole, we are inclined to believe that in Maine, New Hampshire and Vermont, there has been a slight increase—a lessened crop in the rest of New England, New York, and most of the middle states, that the same has been the case in Ohio, about the same, or, perhaps, a better crop in Indiana, Illinois, an increased quantity in Michigan, Iowa and Wisconsin. On reviewing the estimates of past years, and again referring to the census, we have been led, however, somewhat to reduce the comparative estimate of 1845—and this fact must be kept in mind in examining the column for 1847; as it may produce a lessened amount in the table even in cases where a per centage of increase has been allowed.

OTHER PRODUCTS.

Besides the crops which have already passed under notice, there are others which contribute not a little to the agricultural resources of our country, and which are too important to be passed over in silence. Some of these hav for a long time, held a place in the list of agricultural products raised by our farmers and planters. Others have been but recently introduced, and are but partially cultivated.

Among the different crops in question there are, likewise, some of them which are adapted to particular sections as being unable to bear the severity of a colder climate, while others may flourish with equal success in all parts of the Union. It is customary among writers to divide the remaining crops into the root crops, the pod fruits, the oil or drug plants, and the productions of the orchard and garden; and although we may not attempt closely to pursue such a classification, yet there may be, likewise, some advantage in bearing it in mind.

The *root crop* includes the turnip, the beet, the carrot, the parsnip, ruta-baga, mangel-wurtzel, and artichokes, and their use is great, as helping to furnish a substitute for other fodder for animals, as well as contributing in a lesser degree more directly to the sustenance of mankind. The circular sent from the office embraced the most prominent of these, and from the answers returned, it would appear, that they have done well. The greatest yield reported seems to be in the state of New York, and if we may judge from the information we have received, we should judge that they are more cultivated in that state, and one or two of the New England states than in any other part of the country. The returns of the average per acre vary considerably. Of beets 600 to 1200 bushels, carrots 500 to 1200, turnips from 1000 to 2000, the ruta-baga 600 to 1200. This is greater than we have noticed from any of the other states, by from one-third to one-half. It is believed that more attention might well be devoted to these crops. The great importance of the *turnip* crop in Great Britain is almost universally acknowledged there. Hillyard, alluding to the Swedish turnip or ruta-baga, says: "This very valuable root was one of the most important introductions into British agriculture, for without it a sufficient quantity of animal food for our present large population could not have been produced. It was introduced by Sir Joseph Banks about fifty years ago, but as the old race of British farmers believed nothing could be good, it did not come much into cultivation for twenty years. I well remember, about forty years ago, a farmer, supposed in those days to be one of the best in this neighborhood, say to me—'I find you are a great grower of Swedish turnips; you won't continue to be so. I have tried them, but found them so hard and sticky, that I will never grow another.' His were, I have no doubt, as he described, from being sowed broad cast, and left too thick on the ground. The raising a good supply of winter food for cattle, is the very life and soul of farming, for the old saying is a just one, 'no food, no cattle; no cattle, no dung; no dung, no corn.' The abundance or deficiency of the Swede crop throughout the country has a great effect on the price of wheat. If abundant, a large supply of meat is brought to market, the price is consequently low, and when the price of meat is low, the price of bread will not be high. If the crop proves to be deficient, there will be less than an average supply of meat; this will cause the price to be high, raise the price of bread, and consequently, raise the price of wheat."

The following is the method by which the Rev. Mr. Huxtable, distinguished as an English agriculturist, raised twenty tons of Swedes to an acre. He gave the account at the Sturminster agricultural society. He says: "I determined that I would grow twenty tons of Swedes an acre, and five tons of tops. If you burn twenty tons, the result would be 500 lbs. of ashes. Now these ashes consist more than one-half of potash, one-third of soda, one-eighth of sulphuric acid, (which we get in bones,) and the other eighth of sulphuric acid, with a little magnesia. I then got a lot of saw dust and put it under pigs, and decayed it with phosphoric acid. Now how was I to get more potash? I got wood ashes, and found that these wood ashes contained about two pounds of potash to the bushel, and two pounds of soda. Next, I wanted to get the phosphates. These I got from 200 lbs. of Ichaboe guano. The next thing was, how was I to put in the manure? My theory was to make holes about two feet apart, but how was the manure to be applied without destroying the seed? for it is so powerful it will grow no weeds between. I got some good garden mould in which I mixed the seed and manure. The crop began to grow, but the fly got very busy, and I was afraid that after all, I was what they call "diddled." You know white seed will germinate three or four days before Swedes; I got some white seed, and when the plant appeared the fly left my Swedes to go upon the white turnips. Where the children neglected to drop the seeds upon the manure, the roots were not half so big as a marble. Then about three weeks ago we took up these turnips. We weighed nineteen and three-fourth tons upon the highest portions of the land, and upon the heaviest twenty-three tons an acre, the value of which we will now discuss. What was the cost? Thirty bushels of wood ashes, 15*s*. 5*d*.—2 cwt. of guano, 17*s*. 8*d*.=32 shillings. For manual labor, 19*s*. 6*d*. The rent I have placed at 5*s*. the acre; rates and tithes at 2*s*. 5*d*. In all, in round numbers, £4. Now let us see what the Swedes were worth. I find that 42 lbs. of Swedes will on an average put on 2 lbs. of live flesh. Then the value of that at seven cents a pound, dead weight, reckoning that the live weight is to the dead weight as four to three, brings my Swedes to 17*s*. 1*d*. a ton. Now what is the value of the dung? I bring it to 4*s*. 1*d*., which brings it to 21*s*. 2*d*. But I will take the popular value of 15*s*. 5*d*. a ton. Now for £4 an acre I have a return of 300 per cent., and if that is not a sufficient return I don't know what is. * * * * We agriculturists support 27 millions of people, and our produce amounts to the enormous sum of 540 millions sterling, whilst the exported manufactured goods amount, on the average of six years, to not quite 47 millions."

The following table, prepared by Stephen, gives the number of turnips there should be on an imperial acre, at given distances between the drills, and between the plants in the drills, and the weight of the crops, at specified weights of each turnip. The distance between the drills is taken at the usual width of 27 inches; the distance between the plants is what is allowed to the different sorts of turnips, and the imperial acre contains 6,272,640 square inches. On altering the width between the drills, a calculation from these data can easily be made of what ought to be the weight of crop at these given weights of turnips:

Usual dist. between the drills.	Usual distance between the plants.	Area occupied by each plant.	No. of turnips there should be per imp. acre.	Weight of each turnip.	Weight which crop should be per imp. acre.	
Inches.	Inches.	Sq. Inches.		Lbs.	Tons.	Cwt.
27	9 between plants of white turnips.	243	25,813	1	11	10
				2	23	00
				3	34	11
				4	46	00
				5	57	12
				6	69	02
				7	85	02
				8	92	00
27	10 between plants of yellow turnips.	270	23,232	1	10	7
				2	20	14
				3	31	1
				4	41	8
				5	51	15
				6	62	2
				7	72	9
				8	82	16
27	11	297	21,120	1	9	8
				2	18	16
				3	28	5
				4	37	13
				5	47	3
				6	56	11
				7	66	0
				8	75	8
27	12 between the plants of Swedes.	324	19,360	1	8	13
				2	17	6
				3	25	19
				4	4	12
				5	43	5
				6	51	18
				7	60	11
				8	69	4

As a result of some deductions from the above, Mr. Stephen states, that the difference of only one pound in each turnip, from four to five pounds, at nine inches asunder, makes a difference of eleven tons, or twenty-five per cent., so that the difference of only one pound in each turnip, and two inches in the difference between them, makes the enormous difference of twenty-one tons, on the whole crop. This seems to show the vast importance of regulating the distance, and in the management of the turnip crop.

Carrots also form a rich food for cows, and from experiments made in raising them, they hold out the inducement of a fair remuneration. The following is the report made by E. H. Derby, of West Newton, in Massachusetts, who raised, of this root crop, at the rate of 1,080 bushels per acre. The variety he used was the orange carrot. He received the premium of the Middlesex society, in 1845.

Mode of cultivation.—The soil, which is a yellow loam, was appropriated, in 1844, to corn and vine, was moderately manured in the hill, and yielded a fair crop. In 1845, about May 25, it was ploughed by one man, a team of two horses, and the plough put into the beam.

Before ploughing, about 18 buck loads of the compost described below, was spread over the field. After ploughing, the field was harrowed and carefully raked, and the seed put in by a machine in drills, twenty inches apart, and without making any ridges. The field was weeded three times, and the tops covered the surface. Many of the carrots averaged from one to two pounds in weight.

Estimated amount of labor:

Man and team spreading manure,	$1 50
" " ploughing,	1 50
Man and team harrowing and raking,	1 75
Sowing,	33
One and a half pound seed,	75
Twelve days' labor weeding,	12 00
Thirteen days' labor gathering with team,	13 00
Total,	$30 83

Compost.—A compost heap, formed during the fall and winter, three-fifths of which was applied to the two-thirds of an acre, in carrots, and the residue to one-half acre adjacent, devoted to beets, turnips and squashes. The compost consisted of the following materials:

Three cords of peat, at $1 50	$4 50
Four cords of loam, from old walls,	2 00
One and a half load of night soil,	4 50
Three loads of salt ley, at $2 25,	6 75
Seventy-five bushels of leached ashes, at seven and a half cts., delivered,	6 62
Labor, making compost,	1 00
Total,	$25 37
Deduct quantity used on half acre, about ⅖ths of the value,	10 15
Cost of compost for the carrot field,	15 22
Labor, $30 83; Compost, $15 22, equal to	46 05
Estimated value of crop, at the farm, at 24 cts. per bushel,	172 80
Deduct $46 05,—net result,	$126 75

The white Belgian carrot has a high reputation, as also the long Altringham carrot. It is hoped that the seed of some of the best varieties of English growth will be received at this office before long, for distribution. The carrot, as well as the beet, has been applied, with considerable success, in England and on the continent, for mixing with flour and making bread. Various accounts are given in the foreign journals which show that it may be made a tolerable substitute for this purpose.

The *artichoke* has also received a share of attention, as a means of meeting the deficiency from the potato crop. This root, it is believed, will hereafter become more popular and its cultivation be found to be profitable.

The *pod fruits*, such as *peas* and *beans*, are not cultivated, generally, to any great extent in this country, except in gardens. In the south, however, the pea appears to hold an important place. In some parts of Virginia no little reliance is placed on its aid. One of our correspondents from that state, thus speaks of it. After having alluded to the corn crop, he says: Next in point of rank comes the pea crop, which has always been of great importance in this county. It is for the most part raised among corn, being planted between the corn hills and made at the expense of very little additional tillage, other than what the corn alone would receive. After securing enough for seed the peas are usually fed off the lands to hogs, and in that way are a very important auxiliary to the crop of corn, many farmers nearly fattening their pork on peas and potatoes, but in addition to the peas made for hogs, we are beginning to cultivate white peas much more than formerly as a sale crop, usually finding them ready of sale at fair prices, but the present has been a bad year for the whole pea family, and the crop may be put down as twenty-five per cent. below that of 1845. According to the analysis of peas, the inorganic basis of this fruit was the following:

	Seed.	Straw.
Potash,	43.09	8.20
Soda,		12.50
Lime,	4.77	30.53
Magnesia, Peroxide of iron,	8.06	6.93
Phosphoric acid,	40.56	9.21
Sulphuric acid,	0.44	7.01
Carbonic acid,	0.79	17.36
Muriatic acid,	1.96	7.15
Silicic acid,	0.33	0.62

The quantity of ash from 100 parts of substance, was, in seed 3.28, straw 4.15

Some interesting articles on the pea and its cultivation may be found in the Southern Cultivator for 1847, but we have not room to quote them here.

The class of plants which rank under the name of the *cabbage* plants are cultivated to a limited extent, but furnish a considerable amount of products both for the use of man and the domestic animals. They contain but little nutritive matter in comparison to their bulk, but yet are more or less used. Among these we may mention the *thousand headed cabbage*, a name which seems to have been considered by some a mere imposition, unworthy of the least credit. We refer to it here, because the seed of this plant was distributed from this office formerly. To show, however, that it has its merits, we may quote from the London Gardeners' Chronicle, edited by Prof. Lindley, one of the first botanists of Europe, and who could never be instrumental in palming on the public a thing so utterly unworthy as it may have been conjectured, without any knowledge of the plant, to be. One correspondent of the Chronicle says, "In reply to a question lately put in your *Chronicle*, I beg to inform you that I have one and a half acres of the thousand headed cabbage. The half acre I began stripping the last week in October, and up to the end of December I had from it twenty to twenty-five bushels of leaves for my cows per diem. It has been subjected to the alternate frosts and thaws, snows and rains of this very severe winter, and for some days was under water, in consequence of the Thames overflowing its banks. I am so convinced of their excellence for dairy feeding, that I shall this year grow four acres on the plan recommended in Baxter's Book of Agriculture, in the intervals between rows of beans. My method of culture, which I found to succeed, is this: In March last I sowed one pound of seed in my garden. In June I planted out three feet distant, every day, in land broken up by the spade from the grass during the preceding winter. The weather being very dry, I employed one or two old men to water each plant well, having first put round each plant as much of a mixture composed of one part of super-phosphate of lime to three parts ashes, as could be taken up by the thumb and two fingers. As soon as the plants were well rooted, I earthed them up in ridges, and forked the intervals, and in September the luxuriance of the cabbages was such, and the ground was so completely covered by their long and broad spreading leaves, that it was no easy or comfortable matter to attempt to walk up the rows." Another person also says, "I know of no green more hardy, Lapland kale not excepted."

Another still says, "I have been in the habit of growing this kind of brassica for at least twenty years. It is perfectly hardy, so much so that it will stand any temperature in England or Scotland. I from experience consider it a great help to the farmer, particularly in the lambing season, and sheep and cows are very fond of it. The produce of this green crop is very abundant when well managed." And yet another, "I tried some, and found them so useful that I grew more every year. They are the hardiest plant I know of the brassica tribe. I have at this moment a flock of seventy sheep with their lambs, deriving fully half their keep from them, having the run of a large bed of them. They are also a most excellent cow food for this month (March) and April. Last year I weighed some of the stronger when in full vigor, first ready for use, and found them twenty-four pounds; I have no doubt they may be grown to thirty or thirty-five pounds."

After these statements we trust any further vindication of its distribution to be unnecessary, and would hope that those who may have deemed it matter of censure will do us the justice of feeling that they were greatly mistaken in their estimate of it, as deserving to be classed among the impositions of the day.

Large quantities, likewise, of *pumpkins* are often raised for the use of stock; and this vegetable may perhaps deserve more attention, as it requires no additional ground, and is raised among other crops without impairing their productiveness. As an instance of the productiveness of this plant, we notice that of J. B. Noll, of Monroe county, Ohio, who, on seventy-seven rods of land, or not five-eighths of an acre, raised 19,000 pounds, besides seventy bushels of potatoes, which would give of pumpkins at the rate of fifteen tons to the acre.

Onions have also been mentioned in some of the former reports. We merely refer to them now, to quote from a French publication, a mode of raising them in Russia, as furnished to the Imperial Economical Society of St. Petersburg. The onion is cut into four parts, leaving the quarters, however, hanging together at the root, the onion also having first been hung up and dried in the smoke. The same plan, however, it appears by experiment, will answer without drying by the smoke. The quarters thus united are planted, and produce four fine onions. The onion thus treated is the potato onion, and this course has been successfully pursued in one instance for thirty years, resulting in abundant crops.

Asparagus belongs rather to the culinary vegetables as its use is confined solely to the table, but prized as it is as a healthful esculent, the following description of its mode of culture in Germany, sent with a specimen of rare excellence, weighing six pounds for the hundred heads, to the editor of the London Gardeners' Chronicle, may be acceptable to many of our fellow citizens. The writer mentions that the asparagus in Germany is not suffered to become green, but is eaten white for the same reason that it is most raised above ground in England, first that the eatable part may be larger, and secondly that the flavor may be finer.

The manner of growing it is as follows: "It is never planted otherwise than in a deep, light and sandy soil, which has been trenched to a depth of 3 feet, well drained and well manured. A thick layer of horse dung is put on the bottom of the trench and mixed with the soil. Strong loamy and clayey soil is decidedly disadvantageous to the growth of this vegetable. It will not thrive in it, does not become tender and will very often become spotted, and which the common people here call iron mould, especially if drainage has been neglected. We take plants of 2 or 3 years old according to their vigor, and usually plant them in furrows which are made at two feet distance and from 1¼ to 1½ feet deep. The distance between the furrows is likewise two feet. In these furrows the plants are permitted to grow uncovered from the month of March or April, the usual and best time for planting, till the beginning or middle of November, at all events before severe frost is coming on. The soil which has been taken out of the furrows and heaped up at the sides is then put in, and the beds are completely levelled. The plants have had time during summer to establish themselves sufficiently. Next spring the young shoots will make their appearance above ground and if every thing has been duly attended to; if strong and healthy plants have been selected, and if besides water has been given during a given season, not a single one ought to fail. Some people begin to cut the strongest shoots in the third year, but a better result will be obtained by leaving them undisturbed till the fourth summer, only giving them every spring in February or March, a good dressing of cow dung. Manure is the most essential requisite for growing fine and tender asparagus. The shoots are cut at sunrise and late in the evening at a length of not more than nine inches, cutting them with a long knife under ground as soon as the top of the shoot is lifting the soil. Asparagus will always have the finest taste if eaten immediately after having been gathered, but ought never to be kept longer than one day, and should be covered meanwhile with light earth, sand or some other material of this description. It is a very bad practice lately in use with our market gardeners to immerse asparagus immediately after cutting in a tub with water, leaving it in the water till they bring it to market. By this practice the finer flavor is altogether lost, and the cooks should be warned against doing the same. Whenever manure is not very expensive, the culture of asparagus pays well, since the highest and most sandy land where nothing else can be grown with advantage can easily be adapted to its culture, and will yield a rent for a long series of years. Besides the same land may be made use of for carrots when the time of cutting is over. Living myself some hundred steps from the Baltic, and having read different accounts of the famous asparagus culture at the sea coast near San Sebastian in Spain, I have last year made the experiment to grow it in pure sea sand containing no humus or vegetable matter whatever. It only received a moderate supply of manure, and has even not been watered during the last hot summer, nevertheless it is growing this year so well, that I might have cut a tolerable quantity as big as a lady's finger if I would be foolish enough to do so. I have several times eaten green asparagus in Italy and France, but I dare confess for want of better. As far as regards tenderness I am at a loss to understand how asparagus can be improved by being exposed to the drying influence of the air, wind and sunshine." The above account is dated at Travemunde near Lübeck, and the mode menioned of raising asparagus would seem to be worth the trial.

In this connexion we may mention a common plant which is regarded as a mere weed, but which is highly recommended as a vegetable for the table; we mean the *common nettle*, to be used like spinach. In the London Gardener's Chronicle the following directions are given for its use. "Boil the young tops and after pressing out the water from them, warm them again with a little cream, butter or dripping and a very little pepper and salt." The editor of the Chronicle adds, the young nettle sprouts are among the best of all ingredients in spring soups.

The *oil plants* as they are termed, are quite numerous, though but little has yet been done in cultivating them in this country. We have heretofore alluded to them in our former reports, and some of them have been particularized. In addition to those notices we may mention a new species of rape seed, which is spoken of as having been noticed in the Royal Agricultural Society of England with commendation. This is the *brassica chinensis*, or Chinese rape seed, called also the shangai oil plant, a hardy annual, which is grown for the sake of its oil over the whole country, round that city, but which may be cultivated in every kind of soil. It yields an abundance of oil. It is hoped that we may be able in the course of another year to procure some of the seed for distribution.

Another Chinese plant which may perhaps be suitable for cultivation in the warmer sections of our country, and respecting which we hope to gain information hereafter, and perhaps obtain the seed, is the tallow tree of China, *Stillingi sebifera*, called by the Chinese *oo-kieon*, which yields a beautiful vegetable tallow. It is about the height and appearance of a pear tree, with twisted branches and a large rounded head. The fruit is enclosed in a husk like a chesnut, and when ripe the husk opens of itself showing three white grains of the bigness of a filbert. These grains are subjected to pressure or boiled in water, and the oily matter collected is hard and white like tallow. Three pounds of vegetable oil are mixed with every ten pounds of the tallow, and the candles made of it are also coated with wax. They are said to be nearly equal to wax candles. The trees themselves having leaves of a deep purple or brilliant red, and the blossoms being of a bright yellow, the groves formed by them are said to be very beautiful. For a fuller description of the process, see Fortune's China, pp. 65-67.

The *ground pea* of the south, or as it is sometimes called, the gouber or pindar pea, is highly recommended in the Tallahassee Floridian as an oil plant. The account of it is as follows: "To a few only it appears to be known that the product of this plant gives out an oil in some respects unequalled, as an accompaniment to the table: in its natural state this oil has no rival, clear and mild, with a peculiar taste extremely gratifying to the palate, rich and buttery; it is of that consistency so much admired in the preparation of salads, anchovies, &c., for table use." "Among plants the gouber ranks deservedly as one of the surest crops, not withholding a generous yield even on poor land, and amply acknowledging the superiority of rich land if light and friable. The pea is easily gathered and with less labor than any of the seeds or beans is ready for the press. When hulled, which is most readily effected, and ground, the oil flows most freely and uncommonly clean from the press; but when submitted to the known modes of clarifying oil, it becomes liquid and pure, and when immediately bottled and sealed appears to remain in a state of freshness, and retains the fine odor so highly agreeable to the amateurs of vegetable oils in the preparation of food. The refuse, after expression, is admirable for hogs, and the vine for stock, if not returned to the soil in gathering the pea; if saved and cured, which is effected with much ease, it mixes in the cutting box well with rye, barley oats and rice. The product of the fodder is estimated at more than a ton to the acre; and of peas when cultivated alone and well, fifty to seventy-five bushels. The plant is cultivated much north of us, but from fair trial it is found that, like other producing plants, it delights in the rays of a warm southern sun and soil, and that the product is richer with a finer aroma, than the oil from the same plant produced in Virginia and Carolina. I have no hesitation in saying that if this oil was fairly introduced into the northern states, it would take a high rank at the table of the bon-vivants. This oil is more readily and with less labor and expense, procured from the pea than it is from any other seed, bean or pea, we know of. It is hulled and ground by simple machinery, and the press required for the extraction of the oil is neither very powerful nor expensive. The production of this oil for commerce challenges the early attention of planters and small as well as large capitalists. Any quantity could be produced and prepared for market, a great part of the labor being of that kind that would suit all; the child, old age, aud the cripple—all might be employed in the production of this new material. I feel confident that after a little use it would become a successful rival of the best table oil of Europe." If the above account be correct, it would seem that the article is well worth a thorough experiment, and the question may thus be easily decided.

The analysis of the rape plant in respect to its inorganic constituents, is thus given by Dr. Rammelsburg.

	Seed.	Straw.
Potash	25.18	8.13
Soda		19.82
Lime	12.91	20.05
Magnesia	11.39	2.56
Perox. of iron	0.62	
Phosphoric acid	45.95	4.76
Sulphuric acid	0.53	7.60
Carbonic acid	2.20	16.31
Muriatic acid	0.11	19.93
Silicic acid	1.11	0·89

The quantity of ash from one hundred parts of substances, therefore, is seed 4.54, straw 5.21.

In the Journal d'Agriculture Pratique et de Jardinage, we find the mention of a *new oleiferous plant*, which is warmly urged upon the attention of the cultivators of France, as possessing many advantages. It is stated that it may be raised even in the temperature of the north of France, and requires but little expense. We have translated it and insert it here, thinking it may be useful. Some of the advantages it possesses are thus stated: "Children of twelve to fifteen years old, girls and boys, are enough for the labor, which is only a slight weeding, so as not to injure the roots of the plant, but which must be done four or five times a year. The gathering of the fruits is within the capacity of children of the same age. The tree only reaches to the height of a metre (about three and a third feet,) and scissors are sufficent to take off the fruits, almost exactly as the grapes in the vineyards of *Medoc*. There are no severe labors which require adult men, except in the preparation of the soil and the planting of the shrubs, after which the field may be given up to the hands of children, who are abundantly able to carry on the cultivation.

The extraction of the oil is easy and not expensive, the pulp of the fruit which contains it, being softer than that of the olive, a weak pressure only is necessary to express out the juice. After being left at rest long enough, known to any one who is accustomed to it, the juice separates into two different liquids: the upper one retains the white color which the must possessed under the action of the press, and the lower one, if the vessel containing it is transparent, looks like a limpid and golden oil, which can be drawn out clear by a fasset placed in the bottom of the vessel, when the person who has charge of the business thinks the proper time has come.

This mode of decanting it is preferable because the gross substance which swims on top and which nearly a third part of the entire liquid would mix anew with the oil if it was taken out from the top or from the side. The remainder of the manipulations and care to be bestowed on the oil may be learned by example, or the lessons of those who are skilled in the business."

"It is not only by the oil which is derived from it that the *oleaster* is recommended to agriculturists, every thing on the fruit may be put to use, even to the nuts, which on account of their hardness and rounded form are sought for by the turners to make children collars, &c. As for the substance that remains after the pressing, a chemist of Paris has shown that it may at a little expense be used for the toilette, and produce an article superior to almond paste, flour of nuts, and which is used for perfumery. The residuum which the must leaves after it is drawn off is capable of being made into soap, and also furnishes various ingredients for perfumery. The cook too may lay claim to a part of the products of this shrub; its green fruits may be prepared and preserved in salt like those of the olive; they are then much like the delicate olives of Provence." It is likewise said that moderate soils, and even such as are unsuitable for the culture of the cereals are good enough for the *oleaster*, which in almost all soils gives such abundant products as to make its cultivation profitable.

The above account would seem to be worthy of attention and further inquiry, as it may be, this plant would prove suited to many portions of our country if it were introduced.

We have heretofore given some accounts of the cultivation of *madder*, and spoken of this dye plant as one which may be made an article of profit. In Appendix No. 11, we have subjoined a paper on this subject, furnished by M. B. Bateham, Esq., editor of the Ohio Cultivator, which it is believed will afford much valuable information. The value of madder imported into this country is considerable, and if the article is well prepared, there seems no reason to doubt that it would find a ready market. Madder was successfully introduced into France one hundred years since, by Jean Althen, a Persian, to whom a statue is to be erected. This plant it is said, now returns to France nearly 25,000,000 francs, or $5,000,000 per annum. The amount of the madder crop varies greatly one year with another, and it is difficult to give the mean crop. A hectare it is said, in a well manured ground and in favorable circumstances of temperature, will produce 5,000 killogrammes of dry roots, while in unfavorable circumstances it will not yield more than one-half or one fourth of this amount. From the commencement of the present century, the greatest crops are stated not to exceed 25,000 quintals by measure and the least about 10,000 to 12,000. We gather these particulars from the *Annales de l'Agriculture Francaise.*

The average amount per annum of madder imported into this country as appears by returns procured at the Treasury Department, from 1845 to 1847, is about 6,110,000 pounds, and in value, about $600,000. The value given is believed, however, to be too low, as it falls below the usual wholesale market price, one-quarter if not one-half. In the communication of Mr. Bateham, editor of the Ohio Cultivator, (see Appendix No. 11,) to which we have added the returns of the Treasury Department just mentioned, we have most decisive evidence that madder can be successfully cultivated in the United States. The demand for it will no doubt increase, but if the attention of our agriculturists is directed towards it, they will probably not only find it profitable; it may, too, eventually be raised in sufficient quantities to meet the demand. All that seems to be needed now is, the requisite information in respect to the mode of cultivation. This is furnished in the article in our Appendix, to which we have referred.

A number of plants as food for stock are mentioned, which it may likewise be not amiss to allude to here, and the introduction of which would perhaps be attended with good effects. Some of them have been partially tried in this country, but perhaps not sufficiently so, to decide as satisfactorily respecting their real value.

Millet is highly recommended for soiling purposes, and especially for feeding horses in some of the agricultural journals, and judging from the statements made respecting it, it is believed that more attention might be very profitably devoted to its cultivation by our agriculturists.

The *pimpernell (poterium sanguisorba)* is a plant which is well known in Europe and its use for sheep is greatly esteemed. Mention of it will be found in Mr. Fleischmann's communication. It is called the buret grass, and has to some extent been tried in this country, but its use is very limited or scarcely known as yet among our farmers. In the Landwirthschaftliche Dorfzeitung, we find it most highly recommended for milch cows. It is said to increase the quantity of milk and also its richness. Cows are very fond of it. It is adapted to dry and sandy lands, yields a large quantity of herbage and may be cut from time to time for feeding in the course of the summer. It is also an excellent winter fodder and lasts often as pasturage in mild climates from autumn till spring, preserving its freshness of leaf and goodness for food. (See Appendix No. 1, with plate.)

Another plant which is presented as being entitled to greater favor, is the *chicory* or *succory*, or *wild endive chicorium intybus*—a hardy English perennial plant. This was formerly highly recommended by Arthur Young as a forage plant, he having himself tried it with success on his own farm. In its natural state it is said to appear poorly. It has long thick, perpendicular roots, a tuft of lettuce looking leaves, and when it shoots into flower its stems rise from one to three feet high, rigid, rough, branched and clothed with leaves and blue flowers. It is found in England, in dry calcareous soils. On the Continent it has been long extensively cultivated as a substitute for clover. The roasted roots are also used there instead of coffee. It is hardy, withstands the winter and comes forward early in the spring. It will grow in almost any soil however poor, and the mode of cultivation is said to be extremely simple; the land must be deeply ploughed, and about April the seed must be drilled in rows, about nine inches apart; it must be well hoed, singled and weeded during the summer, and the plants will continue to thrive for several years.

The account given of it in the London Gardeners' Chronicle, from which we have quoted these particulars, is in substance the following: In 1787, Arthur Young obtained some seed of chicory, from M. Cretté de Pallene, and tried it. Mr. Young had seen it prevailing in the meadows of Lombardy, and of the south of France, where it is said to grow naturally, also on the sides of the roads and paths and is used for a salad. A bushel of seed weighing about twenty pounds, is enough for an arpent, about three roods. If sown in March, in ground well prepared by good tillage, and afterwards harrowed and rolled it has yielded two crops in a year. It is described as defying the several droughts and resisting the storm, is of early growth and with its large and tufted leaves spreading out sideways it covers the ground so as to retain the moisture and preserve its roots from the heat, which dries up other vegetable productions. Its stalks too, are thick and stiff so as to resist winds or rains. It is of rapid growth, and thus furnishes an abundance of fodder at a season, when cattle tired of winter feeding, greedily devour fresh plants. Mr. Cretté made three and even four regular cuttings of chicory, the first in April, the second in June, the third in August, and the fourth in October, and also cut successively as he wanted it, a quantity for the feed of his cattle, and when, at the end of his field the plants that had been first cut were so grown again as to be ready for mowing a second time. There are no meadows, either natural or artificial it is said, the produce of which can be compared with that of the chicory. Some comparisons are given. Mr. Cretté weighed the produce of an arpent of the finest lucerne, which when green, from the first three mowings, weighed only twenty-four or twenty-five thousand pounds to the English acre, and when dried to hay was reduced two-thirds. The product of clover, he found to be still less. While chicory supplied green fodder to the amount of sixty-one thousand and ninety pounds per arpent, or seventy-two thousand five hundred and forty-four pounds, or thirty-two tons per English acre, and allowing the same ratio of loss in drying, would give nearly eleven tons of hay. As a further recommendation, it is mentioned that cattle are never hurt by this species of fodder, which may be given to them for eight months in the year. It yields a crop too in the month of April, which clover and lucerne do not. Cows easily become accustomed to it, and it is also salutary to horses.

Mr. Cretté tried the experiment of mixing it with clover, sainfoin and burnet, which made a fine artificial meadow from the commencement of June. In a short time, however, chicory took the lead and overpowered the other plants. The meadow was mown at the end of July, the weather proving favorable for the work. The six acres produced thirteen hundred bunches, weighing eleven or twelve pounds each. The fodder was excellent, and was much relished by the cattle. The plants then came up again in September, afforded an abundant pasturage, which was consumed standing on the land, being given up to the sheep. The shepherd was well persuaded that this field of six acres, was more profitable to the flock than eighteen acres of the best lucerne would have been.

It is difficult to make chicory into hay, on account of its volume, as it dries ill unless the weather be favorable. As dry fodder, it was readily eaten by cattle, but it is better to use it when green, in which state it is estimated to furnish the most plentiful forage of any plant. Arthur Young cultivated it for years, recording his experiments upon its productiveness. In the first four years the acreable produce was one hundred and nineteen tons, or nearly thirty tons to the acre yearly; one of these years being a sowing year and one of extreme drought. The only difficulty mentioned in respect to it, is that of eradicating it from the ground. The roots are long and penetrate so deeply that no plough can go deep enough to prevent them from growing up thickly among the succeeding crop. It is therefore necessary to fallow (or sow some crop which requires the land to be well worked) after chicory, before wheat or other grain crops are sown.

Corn and straw fodder enters largely into the conduct of the farm, and yet important as it is, no account has ever been taken of it by which an approximate estimate can be formed of its amount. Its price, too does not appear in any of the lists of prices in the agricultural and other journals. That indefatigable agriculturist, Major J. Jones of Delaware, to whom we are indebted for aid in respect to the crops of that state, in his estimate places the value of it at $185,053,000, for the United States, which even were large deductions to be allowed from it, would show that it ranks far beyond many other crops that are deemed generally more deserving of notice.

We might mention other products which would answer for feeding stock, and some may, perhaps, come under consideration when we take up the subject of the feeding of cattle, but we have already devoted all the space to the particular topic before us which we can allow.

There are a variety of *trees*, which may yet deserve attention in parts of our country, and were they once introduced it seems probable they might be made profitable. The English *walnut* has been recommended as highly suitable for Pennsylvania, Maryland and Virginia, where the raising of this fruit might be made lucrative. A single tree, sometimes, it is said, yields twenty-four bushels. Still farther south it is believed trees of warmer climates might be introduced, and possibly, in future years, the tea tree and similar trees and shrubs may become acclimated there. Experiments made in France seem to show that this is not mere wild conjecture. The attention of individuals at the south has been turned to the cultivation of the olive, with a prospect of success. By experiments the feasibility of such projects may be developed, and it would be no more surprising that they should prove successful than that others deemed more visionary have done so.

There is a steady advance in the attention paid to the cultivation of *orchard fruit* and such others as peaches, grapes and the lesser kinds.

Apples, indeed, are not so much cultivated as formerly for making cider, but greater attention is paid to some fine table fruit. In the various sections of the country, there are individuals who have devoted much time and care to watching the progress of improvement in this respect, and the result of whose observations will be found to be increasingly valuable. The success which has attended the effort to export apples to England and other foreign countries, has awakened a spirit of enterprise, and, probably, this business will hereafter become more general. But for this purpose the great circumspection of those who have led the way will be needful. Those specimens of our fruit which have been presented to foreign purchasers, by Mr. Pell, have been of such excellence, that an inferior kind would meet with but little favor. Judging from the information that we have gathered, we believe that while, perhaps, along the Atlantic border the season has not been the most favorable to the apple crop, yet in the interior and the west, large quantities of this fruit have been raised. Pears, too, have poorly succeeded for a few years past—some of the kinds most highly prized have seemed to be dying out. New seedling varieties have, however, made their appearance, and there is reason to hope that this fine fruit will regain its former standing, especially, as additional experience and skill are now directed to its cultivation.

A similar remark may be applied to *cherries*. Some of the old varieties have given way to new ones, and of these a portion of them are of rare excellence. Figures and descriptions of these may, from time to time, be noticed in our agricultural journals, and, perhaps, there has been no period in which there has been so great a number of really fine kinds occupying a place in our gardens and house yards as at the present.

The *peach* crop of this year was seriously injured by the cold weather of the early part of the season. The buds were so severely touched that they were destroyed. The peach crop of Delaware, the most famous one in the United States, is estimated by our correspondent there, at 300,000 baskets, which, at 40 cents per basket, would amount to $120,000. There are about 2500 to 3000 acres devoted to this business. The peach orchards of Ohio are also large. In the Ohio Cultivator we have noticed a number of particulars which show that the business of cultivating this fruit is increasing in that part of our country. It is stated that a gentleman had purchased a farm of 100 acres for this purpose, for which 10,000 well budded trees were on their way and coming from Philadelphia, as he said he was about to apply the experience gained in New Jersey and Delaware to this object. That fine peaches may be raised in this state is very evident from the specimens which are noted as having been exhibited at the horticultural fairs. At the fair in Columbus, it is stated in the Ohio Cultivator of September, fifteen specimens of Vandermark seedling (from the seed) of the lemon cling, a remarkably handsome fruit, deep yellow flesh, fine red outside, measured over a foot in circumference! One weighed 14 ounces, and four together weighed 2 lbs. 14 ounces. In answer to the above, it is also stated in the same journal, that some have been raised in Illinois which measured 14 inches in circumference and weighed 18 ounces.

In Fairfield county, Ohio, also, it is asserted peaches have been raised 14 inches in circumference.

On Long Island, the peach is cultivated with advantage. In one of the public journals we notice mention of an orchard there which consists of 20 acres, from eight acres of which, at the second bearing the owner would reap about $1250.

It is surprising, also, what quantities of *strawberries* find their way to the markets of our cities. A few particulars, only a slight portion, doubtless, of strawberry statistics, show that even from this comparatively small fruit, much profit must often result. Thus, we find it stated that in twenty-six days, 4572 bushels were sold in New York; 514 bushels in a single day. Over 80,000 baskets equal to 833 bushels, and weighing, probably, twenty-five tons were brought to that city in one day on the Erie rail road alone. The whole number of baskets sent to New York over this road in the course of the season is given at 602,640, being an increase over the previous season of 212,000, or 24 per cent. The average value is about 3¼ cents per basket, the quantity 6247 bushels, and the weight 260 tons; so that the persons residing along the road are supposed to have received about $20,000 for strawberries in the last season. Large quantities of this fruit are also gathered and sold in Cincinnati. A committee of the Horticultural Society put down the best three days' sale at 489, 514 and 411 bushels respectively. It is also stated that a gentleman near Cincinnati was picking 100 bushels every day from a patch of sixty acres devoted to this object. By the report of the committee of the Cincinnati Horticultural Society, the quantity sold there, in twenty-two days of 1846, is given at 4150 bushels. The report of the same committee for 1847, after premising that some small quantities had been brought into the city as early as the 20th of May, commence their estimates May 25th, and end them June 21st; thus making twenty-four days, in which period they report 4552 bushels. This is said to be the actual count of boxes in the market at 8 A. M. How many came to market, but went to taverns, restaurants and confectioners, also, the quantities sold at the corners of the streets, or carried from house to house, is matter, say they, of guess-work. They suppose, however, that it might amount to twenty per cent. on the above amount, so that this would make a total of five thousand four hundred and sixty-two bushels, sold between the twenty-fifth of May and the twenty-first of June inclusive.

In our former reports we have mentioned a variety of particulars respecting the cultivation of the *grape*, as well as its indigeneous growth in this country. The attention given to it, both for the purposes of the table and the manufacture of wine, seems to be on the increase, if we may judge from the information which we have been able to acquire on the subject. Large quantities of this fine fruit are sold in the markets of New York and Cincinnati especially, as well as in some others of our cities. Investigations are also being made to determine the adaptation of the different grapes of our country for the purposes of making wine. In our Appendix, No. 12, we have given a communication on this subject from Mr. Longworth of Cincinnati, furnished to this office expressly for this report, in which much interesting information respecting the progress of this culture will be found. Other papers of interest on this subject may likewise be added if our room will allow.

The cultivation of the grape has also been recommended for some of the southern sections of our country. The enterprise, we notice, is to be undertaken somewhat largely in Florida, and the prospects of ultimate success are stated to be very good. The grape grows there most luxuriantly, and the only cause which has heretofore prevented persons from engaging in its culture, has heen the fear that the frequent rains might destroy the fruit. A method, however, is proposed to be adopted, of constructing arbors, so that the leaves may shade and shelter the grape. The result is not as yet stated, and perhaps it is still too soon to know its success or otherwise. South Alabama has been suggested as affording a favorable locality for the cultivation of the El Paso grape, which is found in the vicinity of the falls of the Rio Grande. The soil and climate, &c., are considered to be peculiarly adapted to it, and the desire has been expressed that efforts should be made to introduce it there.

Besides the usual *varieties* of the native grape, which have been long known, and the merits of which have been more or less discussed in the agricultural journals, we have noticed the mention of some others which may be referred to for a moment. In the Ohio Cultivator, a new variety is noticed as having been found at Cape Girardeau, bordering on the Mississippi, in Missouri, and which is supposed to have been introduced there by the early French settlers. It is thus described: In color and form the grapes resemble very closely the catawba, but the flavor is quite different, being sweeter and more aromatic, and destitute of the musky taste, also without a pulp. The vine is said to be perfectly hardy, and it would appear to be worthy of more examination and propagation. A fine grape, on a small island near Oxford, Michigan, is also mentioned in the

Michigan Farmer. It is to Texas, however, and the region of country bordering thereupon, that we are probably to look for new varieties of native grapes. In a letter received at this office from Dr. C. B. Stewart, of Montgomery, Texas, he speaks of the great mustang grape in very high terms. He says respecting it, that "it is produced and grows luxuriantly without cultivation, and in great perfection, in every part of Texas, and upon every variety of soil, growing equally well upon the high open prairie or in the densely wooded river bottom lands, seeking alike the loftiest trees and the lowliest prairie shrub, and frequently so completely covering the tree or shrub upon which it rests that an entire surface of the vine leaf is presented to the eye. The body of the vine oftentimes attain to six inches in diameter, is rough and covered with a harsh bark, which, scaling off, discloses a smoother and somewhat tender rind; leaves very thick, rough, brittle, serrated, of a dark green color upon the upper side and nearly white on the underside, and cupping under and about three to four inches in diameter. The fruit grows in bunches of eight or ten grapes, in immense numbers, and one-fourth of them being of the size of an ounce leaden ball, and a large proportion of the remainder three-quarters of the size of a three-quarter ounce ball—none of them of less size than the half ounce balls—full of juice, yet having a thick hull and large pulp surrounding the seed. In August, when they appear to be ripe, they are very pleasant to eat, the juice sweet and of an agreeable acerbity, but leaving a farewell twang upon the throat, and which is unpleasant. Towards the latter part of September and October this effect is sensibly diminished, and they are much sweeter and more palatable. From a bushel of these grapes, in clusters, loosely thrown into the measure, I obtained, by a slight pressure in a linen cloth, two gallons and a half of a mucilaginous fluid of a deep red wine color, which remained by me for some two months, unchanged in appearance or taste; a partial separation of the mucilage has since taken place, and the fluid has now become pleasantly acid, of a strong, agreeable vinous flavor, without having passed through any perceptible fermentation. I have not, myself, the time for experiments testing the kind and qualities and yield of wine from this grape, but such experiments as have been made with them have satisfactorily determined that red wines of a high quality and fine flavor can readily be obtained from them. The early inhabitants of the country resorted to this grape to obtain their vinegar, but were not successful in producing acetous fermentation, until, by the admixture of a proper quantity of water, the juice was diluted sufficiently for the acetous fermentation to take place, when good vinegar was obtained. Experiments made some two years since, near Columbus, Colorado, Texas, resulted in the production of fine wine from this grape, of a quality between claret and burgundy, of a superior flavor. In one experiment sugar was added, from the belief that the saccharine matter of the grape was insufficient to produce fermentation; in the other, none was used; the results were equally successful, and the body or strength of the wine such as not to require the addition of any spirit for its preservation. The experimenter was a gentleman of some skill in the manufacture of wine, and from whose mouth I received the above account of his success. I am confident that any mechanical pressure used in the manufacture of wine, would easily and without great force, have obtained from one to one and a half gallons more juice from those which I pressed slightly in a linen cloth. By proper cultivation the introduction of them among wine growing communities, will prove eminently profitable to them." In a still later communica tion from Dr. Stewart, he writes: "This fall a French wine maker and vineyardist came from Kentucky, where he had long been living, to cultivate the grape if he thought well of the country, &c. He is highly pleased, made several barrels of wine for Judge Scott, Fanthorp; Dr. Patrick, at or in Fanthorp's neighborhood. He pronounces the mustang grape to be the port wine grape, and of superior quality and yield. Very intelligent and practical in his views, and of good experience, he took the mustang cluster native from the trees; there was, as usual, an abundant crop of them this year; the wine from this grape, he said, was genuine port wine. He knew it from his experience, but could not demonstrate it to be so, until after fermentation and deposite of the tartaric of potass held in solution in the secret juices. I wait with anxiety for the result. What resources our country possesses in this respect, if this be the fact, for the mustang grows every where in our fair land." He adds: "I found near Fanthorp a native claret grape, of which I have saved a pint of seed, to be planted this spring." He also mentions another variety of grape which he terms the port oak grape, and which he says is a very superior native grape for the table.

Similar to the above commendation of the native grapes of Texas, is the following passage in Edwards' History of Texas, published in 1836. The author was an intelligent preceptor of a seminary in Texas. He says, "Furthermore, of all the countries I have ever seen for producing the grape vine, Texas excels. The variety of kinds and the quality of these kinds, are by far the most numerous and best I have ever tasted. These native grapes are found growing luxuriantly in all quarters, while those in Arkansas and Louisiana, owing to the greater humidity of the atmosphere in those regions, are comparatively acrid and liable to untimely blights. What then will these grapes of exquisite flavor in the province be, when cultivated by the hands of man? as surely no country is better adapted for the culture of the vine than this, where the poorest description of its lands is so admirably suited for vineyards."

It is well known that numerous German immigrants are now settling in Texas, so that under their skill no doubt these native fruits of the recently admitted state, will be thoroughly tested, and if adapted, as is most probable, to the purposes of cultivation, it may soon be known as the great vine-growing section of our union. It is hoped that its residents will examine and decide upon the various kinds which grow wild and select out the best; and most likely new varieties may thus be found which will prove even superior to those above described.

Grape vines often grow to an enormous size. An account is given in the Horticulturist, of one which is growing at Burlington, N. J. At three feet from the ground it measures six feet one inch around the trunk, and at ten feet high it is positively three feet in circumference. It is a native male grape, and has been the wonder of the neighborhood as long back as the memory of man reaches. It is still healthy and its giant folds run over and cover four trees, one of which is a full sized white oak and the others are quite large. This vine grows on upland near a springy soil, its roots no doubt penetrating to the water.

The following scale has been made by Mr. Hoare, of the greatest quantity of grapes which any vine can perfectly *mature*, in proportion to the circumference of its stem, measured just above the ground:

When 3 inches in circumference	5 lbs.
" $3\frac{1}{2}$ " "	10 "

When	4	inches	in circumference	15 lbs
"	5	"	"	20 ‘
"	6	"	"	36 "
"	7	"	"	45 "
"	8	"	"	55 "
"	9	"	"	65 "
"	10	"	"	75 "

As a deduction from this it seems to be required in the cultivation of the grape that no vine should be permitted to ripen its fruit until its stem measures three inches in girt, just above the ground; since this is the lowest figure given, the yield being five pounds.

As it is most desirable to preserve this delicious and healthful fruit, a *mode of preserving* grapes described by Peter A. Mead, in the American Agriculturist, may be usefully quoted in connexion with this subject. The process is a very simple one, and he says that it is perfectly successful; so much so that grapes were sound in February which had ripened under unfavorable circumstances, having been left also on the vine, *until they were frozen as hard as bullets.* Some of them kept till May. He says, "I first take a common unglazed flower pot, and place over the hole in the bottom, a small clam shell (or a piece of a broken pot) to drain off surplus water. I then pour in clean white sand, to the depth of about an inch; next I select a bunch of ripe grapes, perfectly sound and firmly attached to the peduncle. Then I hold in the pot in such a position that they do not touch its sides, and then fill it up with sand, covering the grapes about one and a half inch deep. This being done I set the pot in a room of a temperature of from 40° to 50° or 60° F., and water it about once a week, or as often as it becomes dry, with a watering pot, having a finely pierced rose attached to it." This is the whole of the process, and the writer of the communication referred to, says that it has answered perfectly for six or seven years. Finely pulverized charcoal may be used instead of the sand; the pots may be larger or smaller and one or more bunches may be put in each pot, as circumstances may dictate. When the grapes are to be eaten the sand is washed off in clean water.

Before leaving this subject of fruit, we may refer to the experiments of M. Fremy, contained in the Comptes Rendus, Vol. 19, and condensed by Berzelius in his Jáhr Bericht, on the *ripening of fruit.* In these the following results are believed to be contained:

1st. The progress of the ripening of a juicy fruit is continually interrupted, when it is coated over with varnish, which removes its connection with evaporation. M. Fremy says: "I could, indeed, retard it by covering the fruits with varnish, and on the other hand, accelerate it by making slight punctures on its surface. The same is the case if a slight pressure be made on the pericarp so as to crush some of the cells and allow the air to penetrate to the fruit.

2d. During the progress of the ripening, the oxygen of the air becomes changed into carbonic acid. 3d. The air which is contained in ripened fruit is often a mixture of carbonic acid gas and nitrogen. Oxygen gas is not contained in it in any perceptible quantity, but on the contrary, it is contained in the air which exists in entirely unripe fruit. 4th. The vinous acid in grapes, arises not from the change of any other acid, but it is already in it in the first commencement of its development. 5th. If a tree or branch of fruit be watered during the ripening of its fruits with a weak solution of carbonate of potash, the phenomenon of ripening then advances, the fruit has its color and taste, but it does not form within itself any sugar, because the potash, by the too early saturation of the free acid in the fruit, prevents the operation of the same, by the formation of sugar. 6th. After the assumed ripening, we do not find the free acid destroyed in the fruit, but saturated with potash or lime. 7th. The change which it first undergoes, after plucking off from the tree, is caused in the essential parts, by the oxygen of the air.

Finally, M. Fremy's experiments also prove, that azotized bodies of animal or vegetable origin operate upon the composition of the vegetable acetates in such a manner, that the acid is decomposed and the base unites itself with carbonic acid. We may explain how the carbonate of lime in plants is formed, and whence comes the potash, which gradually saturates the acid in the ripening of fruits. M. Fremy also says, that when we accelerate the ripening of a fruit by artificial means, it is rapidly brought to that period of decomposition which is announced by a yellowish discoloration. In that case the fruit is disengaged of the carbonic acid; the sugar which it contains, soon enters into fermentation, and the cells of the fruit, examined by the microscope, are in general, found to be wounded.

The next topic which deserves our notice, is the products of the *Dairy*. These are a rich source of profit to not a few of our farmers, and by many the processes of making butter and cheese, are carried to great perfection. The first requisite is to select such animals as will yield a suitable quantity of the richest milk. There is a considerable diversity of opinion as to the best kind of breeds as milch cows. The Alderney and the Ayrshire stocks seem to hold the pre-eminence, perhaps, taken as the whole. The next thing, is that the cows should be well fed and kept. The greatest attention in this respect, it is believed, prevails in Holland, where the utmost care is applied to prevent any thing like uncleanliness. Much in the manufacture of butter and cheese, also depends on the requisite management of the milk previous to its being placed in the churn or tub. We have collected several of the *best methods of making butter* given in our agricultural journals since our last report.

The following is the plan, in substance, pursued by Philip Physick of Germantown, who has taken the premium of the Philadelphia agricultural society for two or three years successively.—In the first place, great attention is paid to cleanliness. The *tin* pans are put into a boiler and boiled for an hour, then scoured with white silver sand and pure hard soap and rinsed in pure water and then put away for use. The udders of the cows are washed for three days and wiped with a clean towel. The milk is also drawn in tin pails which have been cleansed in the same manner as the pans; it is strained through a perfectly clean muslin strainer and put into the spring house, till four milkings are collected, then the whole milk and cream are thrown into a common barrel churn, which has been rinsed with boiling water, with a quarter of a peck of hickory ashes and live coals stirred about in it by turning the crank, and then thrown out and the churn rinsed several times with boiling water; the cows' udders are then washed and milked and this milk strained and poured warm into the churn; the churning is done slowly, as the tenacity and hardness of the butter depends on this; it should take three hours. When the butter has come it is collected by a clean wooden ladle and laid on a clean linen cloth as flat as possible, not more than two inches thick. Next take a clean coarse cotton bag which will hold a half peck or more and fill it with ice and with a mallet mash it down flat about four inches thick, place the cloth on it till it is hard, then on a clean white marble slab add finely pulverized salt to suit the taste, and work out the buttermilk with a wooden spoon and ladle; spread the butter flat again, and again sopping up the buttermilk with the linen cloth, which must however, be done very slowly. When it is free from all the buttermilk make it up into pounds or half pounds.

The above process may seem to be, perhaps, over nice and in some respect carried to unnecessary minuteness. Many however err on the other extreme, and it is to be presumed, also, that the particular method in regard to the long period of boiling the vessels, &c., applied only to the manufacture of the single specimen of butter, which was to be offered for the premium. The excellence of the Philadelphia butter has been attributed, also to the prevalence of the anthox oranthum odoratum, or sweet scented vernal grass which is found in the meadows in the vicinity of that city, and which is said to give a peculiar richness to the milk and cream of those cows which feed on it. Were more care taken in respect to the kinds of grass and herbage which are suffered to have a place in the pastures, were only those permitted to grow which are favorable to the production of good milk, and pains taken to eradicate such as are injurious, it can scarcely be doubted that a great improvement would take place in many of the dairies of our country. It would be no very difficult matter to ascertain the nature of the plants growing on any spot, and by observation, those of which the cows are most fond and which possess the requisite properties could be selected. The time and labor would, beyond all question, be abundantly repaid by the increased excellence of the butter and cheese which would be produced.

By a very accurate investigation into the composition of milk and cream, it has been found that the part which forms butter, is contained in minute globules or capsules, the oily particles being covered in little skin. The action of churning is designed to break open these little bags, and to bring the oily or buttery particles together. The more perfectly, therefore, that this is done, the more excellent will be the butter produced. On this account the churn should be well selected and its operation be such, as to secure the end in view in the best possible manner. The more compactly the particles of butter are laid with each other, the less buttermilk of course is found in it, and the more adapted is it for keeping.

It is of considerable importance also, to have the best *kind of implement* with which to *work the butter* that it may as much as possible be freed from the buttermilk. Various articles have been proposed for this purpose, one of which was described in our last report. The following description we take from the Cultivator, where it is illustrated by a plate. It is believed however, that it may be made clear to those who are conversant with the business of the dairy, without any other illustration. On an inclined stand or table, where the butter is to be worked, is fastened a fluted roller twenty-four inches long, and at the end where the handle is inserted eight inches in diameter, from thence it tapers down to two inches diameter, where it is made fast to the table. There are sixteen flutes or creases brought to an edge, and so deep as to make the inside of each flute form a right angle and continued to the surface. The handle is seven and a half inches long and two inches in diameter; at the smaller end of the fluted roller there is likewise a shank five inches long and one and one-fourth inches in diameter, on the end of which is placed a ball two inches in diameter. This ball is designed to work freely in a socket block which is made of two pieces, each three and a half by one and three-fourth inches, cut into a shoulder and let down into the table, so as to rest on the top of the table and secured below by a key-wedge passing through the two parts. The height of the socket in which the ball is to play above the table, must be sufficient to allow the roller to lie fairly along on the inclined plane and to operate to the greatest advantage when the butter is placed beneath it. On the inclined table should be placed a marble block twenty-four inches square, and having around it, cut into the table, a channel to receive the butter milk, to a central point where it may run off in a stream into a bucket beneath.—*Glass milk pans* and pipes have been warmly recommended in some of the English journals, and it appears from experiments which have been made, that they possess some advantages over those of tin and earthen. As yet, however, they do not seem to have been introduced very much in our own country.

Many statements have appeared in the agricultural journals since our last report, relating to the *productiveness in milk of cows*, and the methods of feeding them found to be most successful. The Alderney breed is placed by some persons as far superior to all others for the rich yellow milk which they give. We will name a few instances of the many we have noted, and take these because they come first to hand rather than because they are presumed to be superior to all others. The following describes the qualities of two cows for which the first and second premiums were awarded by the Essex Co. (Mass.) Agricultural Society: The first premium was for a native cow of Henry Cressy, which, from the 21st of May to the 21st of September, four months, gave 4817 lbs. 4 oz. of milk; 19 lbs. of milk, by trial, was found to yield on an average 1 lb. of butter, so that the milk amounted to 253 lbs. of butter in this period. She was fed on grass with the exception of seven weeks, when she received two quarts of shorts per day. The second premium was given to Wm. Averill for a native cow, which from the 24th of May to the 20th of September, four months, gave 4375 lbs. of milk, which, by actual manufacture, yielded 211 lbs. 2 oz. of butter. She, likewise, was fed on grass, with the addition, during the drought and shortness of the feed, for five or six weeks, of one quart of Indian meal and one quart of rye, mixed together, per day. In the Maine Farmer we find mention of a native cow belonging to H. Ingals, of Mercer, Maine, which, in fourteen days, gave 40 lbs. 10 oz. of butter. In the first week she gave 19 lbs. 10 oz. In the second week 21 lbs. In the first week the milk amounted to 253 lbs., in the second week to 367 lbs. 4 oz., being an average for the first week of 25 quarts per day, and in the second week of 26 quarts per day of milk, and allowing a little more than 14 lbs. or 7 quarts of milk to 1 lb. of butter.

By experiments tried in *feeding cows* with mangel-wurtzel, it has been ascertained that a very considerable increase of milk and butter is produced. The following is contained in a pamphlet written by Thomas Newley of Cambridge in England, and published in 1828—One morning he selected two milch cows which had calved in the spring, and turned them out in an over-eaten pasture, and fed them every morning and evening only with hay, the milk was measured at each meal, the cream also and the butter weighed at each churning, and for one week the result was, milk 101 quarts; cream 5½ quarts; butter 4½ lbs. The cows then remained in the pasture another week, and were fed with mangel-wurtzel and hay, each cow having half bushel of the root sliced and given to her morning and evening, and the result was, milk 130 quarts; cream 8¼ quarts; butter 6¾ lbs. The cows remained in the same pasture one week more, and were fed every morning and evening as at first with hay only, and the experiment produced only milk 87 quarts; cream 4¾ quarts; butter 3½ lbs.—thus most decisively proving, that no small part of the increase of the second week must, doubtless be ascribed to the addition of the mangel-wurtzel.

That much depends not only on the kind of food but also on the *manner* in which it is fed out to milch cows, as respects the milk-production, is universally acknowledged. "The softer the fodder for the milch cow, the more the milk," is a common proverb in Saxony, and it is asserted on the best authority that cows which receive for drink luke-warm water, give much more milk than those which drink cold water; especially is this important in winter. It is also recommended that in the winter the appetite of the cows be excited, so as to take the more drink, for which purpose oil-cake and salt are recommended. Some of the best German authors speak of the following methods to promote the secretion of milk. Thus Schweitzer and Kleeman declare that the most excellent means to promote the secretion of milk is always a good and strong appetency to drink. For this object they recommend a paste of boiled potatoes, to which is also added bruised corn, bran, oil-cake and milk, and then thinned with warm water, so that the whole may become a thin fluid; the more the cow will take of it the better. This drink is to be made ready for use half a day before it shall be needed, so that it requires only to be thinned with warm water. Bruised grain and bran appear to gain in nutritiousness when they are scalded some hours before use, in hot water, stirred up and then left to stand covered up till used. Block also strongly recommends, even in summer, in connection with green fodder the same drink, a soup of bran (12 quarts of water for a cow in which 1½ lbs. of bran has been boiled and dissolved) to be given after the first fodder with clover. In the winter this drink, with other articles added to 1⅓ lbs. of rye value given twice, amounting from 20 to 24 quarts daily.

Schmalz prefers boiled fodder after this sort—Clean cut hay, rowen, chaff, &c., he gives it twice a day, morning and evening. Celery also he regards as one of the best roots for the purpose, and would have it kept to be added to the boiled food daily.

As to the time which may be considered *the milking period* we find considerable diversity of opinion among the foreign authors. Block, Koppe, Kreyssig, Pabst and Buddeus, fix it at an average of about 300 days, or that a cow must be useless in this respect for about sixty-five days, viz: three to four weeks before calving, (Koppe says, better four to six weeks, and Dittmann that at least six weeks dried state is necessary for the cow to make her afterwards yield the richest product of milk,) then afterwards the calf needs the milk for from four to six weeks more; that is, if it is to be raised.

Schweitzer in general estimates the period for milking 309 days, while, on the other hand, Flotow, Linke, Meyer, Makensen, allow only 274 days, or three-fourths of the year. Thaer reckoned it at forty weeks, or 280 days. Burger only thirty-eight weeks, or 266 days, for he allows six weeks for the calf, and eight previous to calving, without milking. Yet others vary from 263, 264, 280, 290 up to 300 days. Something must depend on the character of the cow, her age, &c.

The able editor of the London Gardeners' Chronicle gives the following answer to a request for information respecting the *best food for cows.* "Give your cow half a hundred weight of mixed white carrots and mangel-wurtzel in the morning, straw chaff as much as you please in the forenoon, with hot salt water thrown over it, about quarter of a hundred of mixed carrots, &c. at noon, and then an oil cake weighing about two pounds, straw chaff at your pleasure in the afternoon, and three-quarters of a hundred of mixed carrots at night, and if she does not yield a good milk in abundance, it will not be the fault of her food."

Corn stalks is a most excellent *food* also *for cows.* Mr. Morris of Morrisania, whose dairy is celebrated for its rich milk, stated at one of the meetings of the New York Farmers' Club, that he kept 126 cows, and that he fed them on green corn, which he found to make richer and better milk than other food, besides its producing more feed than any other vegetable. The tree corn is highly recommended for this purpose. Taken at the period of its greatest weight, and, probably, of its greatest value for either green or dry food when the corn was full in the milk, it has produced forty tons to the acre.

The *richness of* the *milk* of cows *in butter* depends on two things, the breed being the same—the fodder, and whether the cow is fresh or an old milker. The milk of the fresh milker, as Kreyssig and Schweitzer observe, is thinner than that of an old milker; according to Lampadius the milk of the first month after calving contains $\frac{1}{32}$ of its weight in butter; in four months, $\frac{1}{24}$. If the cow be milked three times a day it is thinner than if she be milked only twice. The proportion of butter in milk depends greatly on the fodder, says Schweitzer; the poorest is straw and slop fodder, the richest clover, roots, &c.; and in general average the milk is richest in the autumn.

As to the *quantity of milk* required *for a pound of butter*, there is considerable diversity of opinion, owing probably to the difference is richness of the specimens examined. Block and Schmalz maintain that from twenty pounds of good creamy milk, or about nine and a half quarts, may be obtained one pound of butter, and that cream is to the milk usually as one to seven. Meyer reckons twenty-seven to twenty-eight pounds of milk to one pound of butter, as does also Schweitzer. The ratio of cream to milk, according to Meyer, is as one to ten. Schweitzer reckons one quart of cream to five quarts of milk, or twenty per cent., and from $2\frac{1}{4}$ quarts of cream one pound of butter, therefore, for $11\frac{1}{3}$ quarts of milk, or $24\frac{1}{2}$ pounds, if we reckon the quart at $2\frac{1}{6}$ pounds, or $27\frac{1}{2}$ pounds, if we reckon it at $2\frac{2}{5}$ pounds, will give one pound of butter. Burger gives twenty-five to twenty-six pounds of milk to one pound of butter. Koppe allows twelve to fourteen quarts of milk for a pound of butter, and considers it a favorable state if twelve quarts of milk will give one pound of butter. The same is the computation of Thaer, Buddeus and Kreyssig, while others fix upon one hundred quarts of milk for eight pounds of butter. We might add yet many others, but these are probably sufficient. It is difficult to find any estimates in our country, as the science of proportions seems to have scarcely excited any attention. The *specific weight of the milk* varies according to its richness in cream. The richest in cream is lightest in specific weight. It varies between 1.028 and 1.035, and on an average, with stall foddering, it may be fixed at about 1.03.

The proportions of fodder to increase of milk have also been observed and noted, but we must omit them here. Should any one desire to pursue this subject further, he may find materials for investigations in any of the volumes of agricultural proportions, which abound in the German agricultural literature, among which, probably, Andre's and Kleeman's Encyclopedias of Agricultural Proportions are the best.

Considerable excitement has been produced, both in Europe and our own country, with respect to *Guenon's methods* of *determining the milking* *properties of cows*, and the *value of the male* also as a stock getter of milch kine, by means of certain external marks or differences of the hair, &c., which the discoverer calls escutcheons. By a recent report of M. Yvart, in the Central Convention of Agriculture in Paris, the following seems to be the present state of this alleged discovery.

It is admitted that there is some general correspondence as respects cows, but the signs are deficient as to the male animals. The classification which M. Guenon has proposed is altogether too minute and extensive to be of practical value, as the pretended distinctions of the subdivisions are not verified on examination. M. Guenon makes eight classes, each of which has eight divisions, so that he thus constitutes sixty-four varieties, besides one more for the spurious kind. If it becomes necessary to retain all of these, M. Yvart remarks that M. Guenon's discovery can make little progress towards a general reception.

A course of accurate experiments is going forward for the purpose of testing the principles thoroughly. Until the result of these is known, probably there will be but little advance in the matter.

One of the largest dairies in our country is that of Col. Meacham, of Pulaski, N. Y. His farm consists of 1000 acres, 300 of which are devoted to grass, and he keeps one hundred head of cattle and ninety-seven cows. In one year he made 30,000 pounds of cheese, 20,000 pounds of which he sold at one time at New York, for from six and a half to seven cents per pound. He feeds his cows mostly on hay and carrots. Of the latter he raises 2000 bushels, and gives each cow half a bushel per day; and besides the benefit derived from his grass for his stock, he gathered not less than 300 bushels of grass seed. According to the state census of New York, taken three years since, the quantity of butter made in a year was 79,501,770 pounds. This, at twelve and a half cents per pound, would amount to $9,937,716. The same year there were milked 999,490 cows, three-fifths of which, it is supposed, were for butter dairies, and the remainder for cheese dairies. This would give, for butter 599,685 cows, which would probably give 500,000 calves; so that a large increase may be calculated in this respect, on the amount of stock kept for butter manufacture every year in that state.

The quantity of *milk* sold *in our cities* is great. Some idea of it may be formed from the fact that 50,000 quarts of milk daily are carried on the Erie rail road, equal, including the cans to sixty-three tons, not less, probably than 15,000,000 or 16,000,000 quarts a year, which did not find its way to New York before the road was constructed.

The importation of cheese into Great Britain is larger than that of butter. The total quantity in 1846 from Europe amounted to 249,664 cwt., and from the United States to 91,901 cwt. The *American cheese*, however, is said to have some *faults* which need to be corrected to render it acceptable to the English market. These are stated by Mr. Coleman to be, 1st. The softness of the rind, which renders them liable to crack, and which is imputed to their richness, and the remedy for which is to let the cheese, when taken from the press, remain in brine so strong that it will take up no more salt, for four or five hours. It must not, however, be kept too long in the brine, as it may receive injury. The second fault complained of is the acid and sharp taste. This is imputed to some improper preparation of the rennet, and possibly to something wrong in the feed or pastures. It is also recommended that American cheese should be colored so as to resemble the English cheese. The American butter is a poor article generally there, and does not find purchasers for table use, but is used to grease machinery in the manufacturing districts.

The next topic we have usually considered in these reports, is the various *modes of feeding cattle and stock of different kinds*, embracing the divisions of nutrition from food, methods of keeping, and other particulars closely connected with the whole subject. To no one subject connected with agriculture does the attention, both of practical men and men of science, seem to be more carefully or earnestly devoted than to this great one. Its importance is increasingly felt, and every year multiplies both the number and the accuracy of the experiments instituted to ascertain the facts of greatest interest connected with it. We have a large mass of valuable material collected, most of which too is probably new in this country, and our only difficulty is to make such use of it as shall embody the results in the best manner. We may refer, however, in the first place, to the communications of Mr. Fleischmann, Mr. Ellsworth and others, in our appendixes, for many things useful relating to this subject.

Leaving the theory of nutrition till the close of our remarks on this general topic, we may perhaps more profitably first proceed to present some facts in relation to *articles of food for stock* of various kind. We cannot however enter much into detail. The agricultural journals, both foreign and domestic, are full of able treatises on the subject. Our object is rather to enlighten by the publication of information which may be supposed to be beyond the reach of the majority of our fellow citizens, than to repeat such as may be already familiar to them.

Considerable discussion has existed among the agricultural public as to the best *form in which food shall be given* for the purpose of feeding or fattening. Some persons advocate one method of preparing food, and others directly the contrary. The true course in regard to the matter is doubtless to collect and compare the results of experiments made. We labor, however, under one serious difficulty in this respect. It is not always easy to satisfy ourselves that entire accuracy has been applied in conducting the trials made. There is too great vagueness in the description and many things which may be supposed to influence the result are often wholly or partially overlooked. Numbers are given conjecturally or in gross, and no regard perhaps is paid to the difference in the times of weighing or modes of measuring, and hence no two results of different individuals can be brought together for each comparison, and in many cases hardly can those of the same person. We must, however, take them as they are, selecting such as seem to be best entitled to credit. Many of them may at least show the general effect of the particular modes of feeding adopted, although it is not improbable that these might be considerably modified were they to be still more closely carried on.

In the Transactions of the Yorkshire Agricultural Society, we find a prize essay containing a report on the feeding of stock with prepared food, &c. by Jos. Marshall, who seems to have succeeded in fattening stock by giving them good food and suitably preparing it. We extract a few of its details: At 6 A. M. each beast is supplied with about 40 to 45 lbs. of yellow bullock turnips sliced; at 10 A. M. with 1 lb. of linseed boiled for 2 or 3 hours with about 1½ galls. of water, 2½ lbs. of ground corn and 5 lbs. of chopped straw, at 1 P. M. the turnips are repeated, and at 5 P. M. the prepared food is repeated. At night a little straw is placed in their racks. The ground corn and chopped straw must be mixed together first, and then the boiled linseed being poured upon them and mixed with them, may be allowed to stand for 1 or 2 hours, and given while it is yet warm; for if allowed to stand a few hours the mass ferments and quickly turns sour. The greatest cleanliness is also necessary in the vessels and implements made use of. Such is the practice: now for the results. In one case two of the most thriving were selected from a lot of 12 bullocks of nearly the same age and condition, and for the first month were fed on the usual food, swedes turnips, linseed cake and bean meal in the proportion named below. Two others of nearly equal weight were fed with the prepared food. All the four were weighed at the commencement of the experiment April 11, 1846, and their weights are given below in table 1. Nos. 8 and 9 were fed in the new way, the other two in the usual mode. They were weighed the second time on the 15th of May.

Table I.

No. of Stall.	Live weight, April 11.		Live weight, May 15.		Increase in weight.	
	Stones.	lbs.	Stones.	lbs.	Stones.	lbs.
8	83	8	88	4	4	10
9	79	8	85	1	5	07
12	81	0	85	2	4	02
13	85	0	89	0	4	00

Thus the bullocks fed in the old way gained in five weeks 8 stone, 2 lbs., and those fed in the new way in the same time gained 10 stone, 3 lbs. Convinced that those which made the least progress were the most thriving animals, the person trying the experiment next fed the whole 4 for a month alike on swedes, mangel-wurtzel, &c., and the prepared food, and the following was the result:

Table II.

No. of Stall.	Live weight, May 15.		Live weight, June 15.		Increase in weight.	
	Stones.	lbs.	Stones.	lbs.	Stones.	lbs.
8	88	4	92	4	4	00
9	85	1	90	12	5	11
12	85	2	92	07	7	08
13	89	0	96	00	7	00

The impression that 12 and 13 were the best thrivers was thus fully sustained, as these gained 14 stone, 5 lbs. while 8 and 9 only gained 9 stone, 11 lbs. Comparing the increase of the same two bullocks, Nos. 12 and 13 when fed in the old for 34 days, viz: 8 stone, 2 lbs. with the increase of the same when fed in the new way for 31 days, 14 stone, 5 lbs., the superiority of the latter mode is very evident. Next we may look at the cost.

First Method of Feeding.

10½ lbs. of linseed at 7s. per bush. of 56 lbs. or 1½ per lb.,	1s.	3¾d.
35 lbs. of bean meal at 1s. per stone,	2	06
100 lbs. of coal daily at 14s. per ton, or 4s. 5½d. per week for 20 bullocks or for each per week,	0	2¾
Extra wages 4s. per week or $2\frac{4}{10}$d. per head, say	0	2½
Cost per head per week,	4	3

Second Method of Feeding.

21 lbs. of oil cake at £10 per ton or 15s. per stone,	1s.	10½d.
21 lbs. of bean meal at 1s. per stone,	1	06
20 stone of turnips, extra, say	0	11½
Cost per head per week,	4	04

It will be seen, therefore, that the cost of the two systems is almost exactly the same, while the increase from one is much more than from the other.

The following calculation gives the *relative value of* certain *kinds of food*, in a little different form from what is sometimes stated:

Crops.	Average produce per acre of tubers and grain.	No. of lbs. of true nutriment contained in product of an acre.
Beet, Mangel Wurtzel and turnips,	30 tons.	672 lbs.
Beans,	30 bush. or 1980 lbs.	594 lbs.
Potatoes,	8 tons.	358 lbs.
Peas,	20 bush. or 1160 lbs.	348 lbs.
Barley,	36 bush. or 1872 lbs.	243 lbs.
Jerusalem artichokes,	10 tons.	224 lbs.
Wheat,	25 bush. or 1500 lbs.	180 lbs.
Oats,	30 bush. or 1200 lbs.	132 lbs.

Mr. Spooner an eminent lecturer on the subject in England lays down the following propositions with respect to the best food for stock. The skill of the feeder is best shown by the most perfect combination of food calculated to produce most fat, and to get rid at the same time economically of the roots, straw and hay which has already been supplied. Animals cannot be fattened on roots alone on account of the bulk of the food and especially because they contain so great a per centage of water. Straw alone will not answer because of the vast amount of food thus required. It may however be cut into chaff and usefully employed.

In respect to the *comparative merits of dry and fresh fodder*, according to the experiments of Boussingault, it appears, that the fodder obtained from hay is equally nourishing with that from fresh grass. A heifer was weighed and fed for ten days on green fodder, each day a quantity equal in weight to that consumed being put aside to dry. The animal was then weighed and fed for ten days on the dry fodder, and weighed again. The experiment was repeated three times, and each time the animal weighed a little more after feeding on the dry fodder than after the green. The difference was not enough to prove that the dry food was the more nutritious, but that it was fully equal to it.

A *compound for feeding cattle*, prepared by Mr. Warner, has a high reputation in England, and if we may judge from the experiments detailed, of the success of those who have tried it, it is a valuable improvement. It is composed of linseed reduced to a fine meal and barley to the thickness of a wafer by a crushing mill. Put eighteen gallons of water into the cauldron, and, as soon as it boils, not before, stir in twenty-one pounds of linseed meal, stir it for five minutes, and then sprinkle in sixty-three pounds of the crushed barley while another person stirs it in. When thoroughly incorporated, which will be in ten minutes, cover it down, throw open the furnace door and deaden the fire, so that it will merely simmer till the barley has absorbed the mucilage, when the kernels will resume their shape. and may be compared to little oil cakes.

The advantage to be gained by *boiling or steaming food*, is now considered to be well settled. That many kinds of food are increased by boiling admits not of a doubt.

4 measures	of oats have thus been increased to	7 measures
4 "	of barley " " "	10 "
4 "	of buckwheat or bran "	14 "
4 "	of maize " " " "	13 "
4 "	of wheat " " " "	10 "
4 "	of rye " " " "	15 "
4 "	of beans " " " "	8½ "

The great importance of *warmth*, in respect to cattle, is becoming more and more understood. There can be little doubt that a due attention to this particular might aid in saving millions of bushels of food in the course of a year or two, while at the same time the actual benefit of the food given would be greater.

The use of *salt* among the food of animals has been highly recommended. It would appear, however, from some experiments of M. Boussingault, that the only effect of salt is not by way of any nutritious qualities, but merely as a sharpener of appetite. The animals which were supplied with salt ate more, and the food was sooner absorbed in the proportion of two hundred and two to two hundred and seventeen, or one thousand to one thousand and seventy-four; their thirst is also excited, or they drink more in the ratio of 32.86 to 41.16, or one thousand to one thousand two hundred and fifty-six. The following are the experiments undertaken, with the results of them. There were two lots, each of 3 animals, A. B. C., and A′. B′. C′., respectively:

	With salt.				Without salt.		
Lot No. 1	A. weighing	165	kilogrammes.	Lot No. 2	A′. weighing	146	kilogrammes.
	B. "	158	"		B′. "	154	"
	C "	157	"		C′. "	152	"
		480				452	

They each received at the rate of three kilogrammes of hay per diem, for every hundred kilogrammes of live weight. Each lot had, also, every successive day, better food than in the preceding day, and, whenever a ration was distributed, they were first weighed. The whole time of feeding lasted one hundred and seventeen days. In this time the first lot consumed, of hay, seven hundred and ninety-two kilogrammes; of rowen, nine hundred and forty kilogrammes; beets, three hundred and twelve kilogrammes, in all one thousand two hundred and fifty. Consumption in hay, two thousand and fourty-four, and salt twelve. Lot number two, without salt, hay, seven hundred and fifty-three; rowen, eight hundred and seventy; beets, one thousand one hundred and sixty kilogrammes, in all one thousand nine hundred and thirteen hay value. The first lot drank daily fifty-four litres of water; second lot drank daily thirty-one litres of water.

First weighed 15th Nov.	11th March.	Gain in 117 days.	2d lot weighed 15th Nov.	11th March.	Gain in 117 days.
A. 165 kil.	210	45	A′. 146 kil.	171	25
B. 158 "	200	42	B′. 154 "	214	60
C. 159 "	208	51	C′. 152 "	205	53
480	618	138	452	590	138

In respect to some articles of food for animals which have never been introduced with us, we may mention *whins* or *gorse* as a food for cattle and horses. In the London Gardeners' Chronicle we are told, that if prepared by bruising, they become a very relishing and useful food. *Carrots*, also, have been fed out to horses alternatively with oats to advantage. We might add largely to the examples we have given, but it is hardly necessary. Some very excellent observations on these subjects may be found in R. D. Thomson's researches on food for animals. Mr. Thomson's experiments bear also on the question connected with the formation of butter as influenced by the food given to the cow, and will amply repay to any one the time and labor of perusal. We would likewise refer to some papers on the feeding of cattle, translated from the German, and subjoined in our Appendix 14. Mr. Fleischmann's communication likewise gives a description of the mode of feeding cattle at Alcsúth in Hungary, which we would further commend to the notice of those who may read this report. It will be found towards the latter portion of Appendix No. 1.

In Appendix No. 14, together with other papers on the feeding of cattle, sheep, &c., we have given a list of *plants offered to different animals*, according to a series of experiments published by Linnæus, but which seems to be almost unknown at the present day, as it is nearly one hundred years since it first appeared in English.

The accounts given by Mr. Fleischmann, of the mode of feeding and management of *sheep* in Germany, the rules for judging respecting *wool*, and the *wool trade* there, are so full that it is unnecessary for us to devote much attention to this topic. The facilities of our country for raising sheep and producing wool are great. We will quote a few of the items in this respect which have met our notice. Vermont, though lying far north, yet seems to furnish some of the best specimens in the United States. The number of sheep raised there is large. Care has been taken to preserve, as far as possible, the original breeds, which were imported from Europe many years since. In Addison county alone, it is stated that there were over one hundred thousand sheep, which, for want of hay in 1846, would have to be driven to other sections to be wintered. More than one million of sheep were reported by the census as raised in this state. In the other New England states, also, much attention is devoted to the improvement of the fleece, and recently some fine Saxon bucks and ewes of the electoral breed have been imported for this purpose.

The following relates to the production of wool in Washington county, Pennsylvania.

"A gentleman who is extensively engaged in the purchase of wool informed us that this year's clip in that county is estimated at 1,300,000 lbs! The price paid per pound by purchasers ranged from twenty-five to sixty-two and a half cents. Our friend averaged the price per pound at thirty-seven and a half cents. According to this estimate, therefore, the large sum of $487,500 was realized by the farmers of Washington county for this year's clip of wool!"

The attention of the agriculturists of the south and south west, has been directed, within a year or two, to the fine capabilities of many parts of those sections of our country for raising sheep and wool. In a report on this subject to the Union Agricultural Society of South Carolina, it is said, "thousands of acres of land now are thrown away, in every section of the back country, upon which sheep would subsist well during the summer months. In the winter they may be kept at a very trifling cost." Cotton seed is said to be an excellent winter food for sheep, as they are very fond of it and thrive well upon it. The climate is peculiarly well suited for some varieties, and will admit of their being pastured much later than they can be further north. A report on the value of sheep husbandry, by the Hon. R. F. Simpson, of South Carolina, may be found in our Appendix, No. 14. We would refer for a full discussion of the advantages of the southern section of our country and adaptation for this branch of agricultural industry, to the letters of Mr. Randal of the state of New York, which have been published in our agricultural periodicals. Various articles also may be found in the Alabama Planter and other journals, calling the attention of the public in that and the adjoining states to this important branch of husbandry for the south.

The Ohio sheep crop too is an extensive one. From various accounts in the Ohio Cultivator, it would appear that an enlivened interest has recently been excited there, which promises to result in an increased production of wool. A convention of wool growers was held at Steubenville on the 10th Feb. 1847, attended by individuals from different states, at which much interesting information was communicated, and in a report prepared for the occasion, the great importance of having wool well washed and cleaned, and of ascertaining the best foreign markets for wool was urged. Committees were appointed for these purposes, and depots for the sale of wool recommended to be established in Springfield, Mass., Wheeling in Va., for the eastern and western sections of the United States.

Many sheep in the course of the year or two past have been taken from Pennsylvania to Wisconsin, and the prospect indicates that more attention will hereafter be paid to sheep raising and wool growing in that section of our country. Michigan also is thought to possess many advantages for the growth of wool. A writer in the Cultivator describing the advantages of Michigan as an agricultural state, gives the following statement in reference to this subject. "The advantages of Michigan as a wool growing state, are beginning to be appreciated. The surface, broken into gentle hills and valleys is covered with a spontaneous growth of grasses, which are relished by sheep and cattle and will alone furnish them sustenance for at least eight months in the year. The export of wool from Detroit alone in 1844, but a few years from the first introduction of sheep into the state, was 236,000 pounds. "Since then the hills and meadows of many parts of the state have been covered with fine flocks." We might multiply statements and notices respecting different portions of the United States, as adapted to wool culture, but it is unnecessary. The number of sheep, pounds of wool, and pounds to each sheep, given below, are taken from a statement made to the New York Farmers' Club. We have no data for the estimates, but those for the United States were so grossly erroneous in the quantity of wool, as printed, that we have taken the census returns and have considered them even as too low, and have accordingly given what we consider a fairer estimate of the number of pounds of wool to each sheep at 2.5 to 3 pounds.

	No. of Sheep.	lbs. of Wool.	lbs. to each Sheep.
England and Wales	20,500,000	112,500,000	over 4.25
Scotland...............	3,500,000		
France................	39,000,000	93,000,000	2.4
United States..........	19,311,364	35,802,000, should be at least 48,000,000.	2.5 to 3

The number of sheep must have increased largely in this country since

1840. By some it is estimated as high as 30,000,000. This we believe may be too large an estimate, though the number probably reaches above 25,000,000. From the reports to the Ohio Board of Agriculture the number given for 1846 is 2,065,842. The number reported in the statistics of Connecticut, for 1845, is 289,574. The number given in the statistics of Massachusetts, for 1845, is 354,943. In the statistics of New Hampshire, for 1845, the number mentioned is 488,272. The returns of the New York state census, for 1845, give 6,443,855. It will be seen by the above that the number of sheep in the United States must be large.

Compared with the census of 1840, the number in New York in five years had increased above 1,300,000. The data of the other states do not show a comparative increase, but as they were imperfect no comparisons can be rested on them. The increase in New York too seems to have taken place notwithstanding that the prices of wool did not give any additional encouragement, judging from the subjoined prices of wool in western New York, for eleven years, as follows, which we take from the Cultivator.

1835	average	price	35 cts.	per	pound
1836	"	"	36	"	"
1837	"	"	37	"	"
1838	"	"	35½	"	"
1839	"	"	47½	"	"
1840	"	"	33	"	"
1841	"	"	36¼	"	"
1842	"	"	30½	"	"
1843	"	"	28	"	"
1844	"	"	39¼	"	"
1845	"	"	29¼	"	"
1846	"	"	24	"	"

The latest quotations at New York are as follows:

Saxony fleece	40 to 47½
Merino	35 to 40
¾ to full blood	35 to 40
Common	29 to 30
Lambs, city pulled	27 to 28
" " super	29 to 30
" country pulled	20 to 32
" " super	32 to 35

The fluctuations of prices above given, in some cases are remarkable, but notwithstanding this the number of sheep has become more than one fifth larger. If we might allow the same increase on the census returns in all the states, we should bring the whole number at about 25,000,000, for the year 1845, since which doubtless there has been a proportionate increase in the whole number.

In Appendix, No. 14, will be found a paper from Mr. Ancrum recommending *wool matresses*, which contains some interesting particulars relating to the subject of wool generally. He appears to think that this application of wool will not only be salutary to health, but advantageous likewise in opening a market for our wool growers of no trifling consequence. It is believed that the article will be interesting to many of our agriculturists, and therefore we have inserted it, without, however, presuming to give any opinion as to the feasibility of the plan. The trial might be made, and the results published might be very useful.

In our former reports we have dwelt on the subject of *hogs* and their *products* to considerable extent. We have this year procured an article relating to the "hog crop," as it is termed at the west, by Mr. Cist, of Cincinnati, which will be found subjoined in Appendix No. 15, and which will repay the time devoted to the perusal of it. The progress of slaughtering hogs and cattle for the market is rapid. According to a statement published in the St. Louis Republican in 1845–6, the number of hogs slaughtered there for the season was 30,948, of cattle 3,508. The year previous it was estimated at 16,000 hogs and 2,500 cattle. The pork crop of the west, of 1845–1846, was estimated at 1,054,624, being an increase on the former year of 179,824 hogs; and the number of barrels of pork supposed to have been packed that year was supposed to be about 60,000. The whole number of hogs in Ohio in 1846 was 1,405,621, and in sixty-one counties in 1847 it appeared there had been an increase of 274,247, or 25 per cent., at which rate the whole state would give 1,756,000 hogs for the year 1847. We find in the Ohio Cultivator notices of large hogs raised at the west, of which the following is a specimen: Mr. Haynes, of Centreville, Montgomery county, had raised on his farm, by N. Gaskill, a lot of twenty-two hogs of the following weights—528, 521, 514, 506, 505, 504, 486, 478, 420, 446, 455, 430, 457, 415, 468, 580, 457, 430, 447, 432, 408, 435. Total, 10,222 lbs.

At the Beresford slaughter was a lot of seven hogs, raised by a Mr. Edwin Bedford, of Bourbon county, Ky., which averaged in weight 720 lbs. Two others are mentioned as having been raised in Hardin county, in the same state, the weight of which was over 1600 lbs. If we should estimate the whole crop of Ohio this year at 250 lbs. apiece, which must be a low average, as the number did not include the six months old pigs, it would give for the hog crop of Ohio not less than 450,000,000 pounds.

In Mr. Ellsworth's communication, already noticed, will be found an account of some experiments in feeding swine, and we have collected various others, which, however, we shall be obliged to omit for want of room. The following speaks of the excellent qualities of *parsnips* as a means of *fattening pigs*. It is taken from the London Agricultural Gazette. The writer says: "My pigs are fed once a day with wash from the house, and three times a day with parsnips as they were drawn from the earth, neither washed, cooked, nor cut. I calculate that the produce from two and a half rods is quite sufficient to fatten one pig. The last animal I killed weighed twenty-four stone, five pounds, (341 lbs.) and was between nine and ten months old. The pork was declared by all to be excellent, very tender and delicate.

In the Oekonomische Neuigkeiten we find an experiment in fattening hogs on milk, which was very successful; but it may be doubted whether it would not be a less profitable use of milk in our country than its common one, and probably but little could be learned respecting the raising of this great staple of the west, from the comparatively small experiments of the agriculturists of Germany, though their experiments are generally conducted with far more precision than those in our own country.

We have but little likewise to add on the subject of *Poultry*. That the keeping of hens may be made profitable, if rightly conducted, scarcely admits of a doubt. In one instance the account is thus given:

Dr.	To 45 hens, at 25 cents	$11 25
	" 4 cocks, at 50 "	2 00
	" grain fed out	20 00
		$33 25
Cr.	By 3302 eggs	34 02
	Chickens killed during the summer and fall	14 84
	By 100 fowls on hand, at 25 cents	25 00
	" 4 cocks, 50 cents	2 00
		74 86
		33 25
	Clear gain	$41 61

Another individual mentions that from 21 fowls, 20 hens and 1 cock, he gathered in 10 months 2248 eggs. In Massachusetts from 45 hens were gathered 41 dozen eggs in January, and 26½ dozen during the first sixteen days of February, making in all 752 eggs, or about 17 apiece on the average.

A writer in the London Gardeners' Chronicle gives the following direction to make the hens lay all winter, which would appear to be worthy of consideration by those who may be engaged in the business of raising poultry:

"Keep no roosters; give the hens fresh meat, chopped up like sausage meat, once a day, a very small portion, say one-half an ounce a day, to each hen, during the winter or from the time insects disappear in the fall till they appear again in the spring. Never allow any eggs to remain in the nest for what are called nest eggs. When the roosters do not run with the hens, and no nest eggs are left in the nest, the hens will not cease laying after the production of 12 or 15 eggs, as they always do when roosters and nest eggs are allowed—but continue laying perpetually. My hens lay all winter, and each from 70 to 100 eggs in succession. The only reason why hens do not lay in winter as freely as in summer, is the want of animal food which they get in the summer in abundance in the form of insects. I have for several winters reduced my theory to practice, and proved its entire correctness."

It is stated that a bushel of corn will last twice as long for hens as a bushel of buckwheat, but the latter will make hens lay eggs more than any other grain, and the profit overbalances the cost. The number of eggs sent to market and consumed is very great. In the year 1846 it is said that 3,000,000 were packed and sent from Cincinnati in the spring. A single canal boat is noticed in a Rochester paper as on her way to Albany with 239 barrels of eggs, each barrel containing 90 dozen, which would thus give 258,120 dozen eggs. In France it is stated that 7,250,000,000 eggs are annually used, of which Paris consumes about 120,000,000. The importation of eggs from France by England amounted in 1838 in value to nearly $1,000,000, and the annual average amount is estimated at 100,000,000 of eggs. The amount of money invested in poultry in England is supposed to be not short of £8,000,000.

A great controversy has been going on for some two or three years, respecting the true *theory of the nutrition of animals*. While willing to concede much to Liebig's investigations, yet there are many, both among the English and French physiologists who disagree with him and think that he has been misled and that his principles will not stand the test of trial. We cannot enter largely upon this question, but shall here quote from another some remarks, which seem to us to give a true view of the state of the case. "The researches of Liebig, Dr. Prout and others, render it probable, if not certain, that azotized substances yield nutriment to the animal structure, and that non-azotized or carbonaceous substances are employed in the respiratory process and produce animal heat; but many facts are at variance with Liebig's opinion that non-azotized principles are incapable of supporting animal life and of nourishing the tissues; or that principles devoid of nitrogen cannot be converted into azotized compounds. Fresh animal food devoid of fat contains 13.6 per cent. of carbon, and although fresh, ripe fruit contains but 12 per cent. yet saccharine and amylaceous substances, upon which the inhabitants of hot climates principally subsist, contain from 36 to 47 per cent. of carbon, and consequently would be likely to generate a much greater quantity of heat than could readily escape unless the non-azotized principles were capable of conversion. Fish, leaches and other animals whose structures abound in nitrogen, both live and increase in weight, although kept in pure water or fed on non-azotized substances. Anderson says that the nomadic Moors have scarcely any other food than gum senegal, which contains no nitrogen, and Hasselquist relates that a caravan of Abyssinians, consisting of one thousand persons, subsisted for two months on a stock of gum arabic alone. Those who gather gum from the trees in Arabia and Senegal live (for a time) almost entirely upon it, and six ounces in twenty-four hours have proved sufficient for man's support. On the contrary those articles which contain the most nitrogen are not always the most nutritious, it having been proved that leguminous seeds (as peas and beans) which contain more of the azotized principle than the cereal grains, are less nutritive than the latter. Liebig attributes this to their deficiency in earthy phosphates; but according to Braconnet they contain twice the quantity which wheat contains, and twenty-four times the amount found in beef. Animals fed exclusively on gelatine the most highly nitrogenized principle of the food of the carnivora, die with all the symptoms of starvation. The Russian and Greek laborers and those of many other countries will work from twelve to sixteen hours a day with great power and activity while living on about one pound of coarse bread with a small bunch of garlic, figs, raisins, &c., while according to Ross, Cox and others, the Canadian boatmen, Patagonians, &c. who subsist exclusively on animal food require from six to eight pounds of flesh in twenty-four hours. Despretz ascertained by experiment that the herbivora expire more nitrogen than the carnivora—an inexplicable fact, unless nitrogen can be supplied in larger quantities than the food itself contains. Dr. Prout says he has found albumen (an azotized principle) in the duodenum, when none was found in the stomach, from which circumstance he concludes that a highly azotized principle may be secreted from the blood, either in the stomach or duodenum, or both, for the purpose of being united with the unazotized constituents of the food to form a compound adapted to the nutrition of the tissues. "This involution of azote," he observes, "may be considered as one of the great objects of mastication and insalivation which are almost peculiar to animals chiefly subsisting on saccharine matters." Tiedmann and Gmelin, as well as other physiologists, believe that the secretion of the pancreas adds to the chyme, richly azotized animal substances, albumen, casein, and osmazome, by which it is brought nearer to the chemical composition of the blood and prepared for its complete assimilation. Thus is a portion of nitrogen supplied to such alimentary matter as is destitute of it. A large amount of fat and a small quantity of fibrine are found in the lacteals previous to their passing through the glands of the mesentery, and to their receiving the lymph from the spleen; after which the proportions are reversed. It appears therefore, that the oleaginous principles of the food are gradually converted into azotized principles, and that the fluid of the splenic lymphatis assists in effecting this change. The fact that blood contains more nitrogen than the chyle has been proved by the experiments of Macaire and Marcet. There are many other facts which might be named which point to the atmosphere as the source of nitrogen, both to men and animals, when their usual food is deficient of that necessary element; and when it is considered that four-fifths of the atmospheric air is nitrogen and only one-fifth oxygen can it be supposed, that whilst the latter is acknowledged to be of such essential service in nutrition as introduced into the system by mastication, deglutition and respiration the former should be given out through the skin and lungs, as Liebig states, 'without being applied to any use in the animal economy?'" "The experiments hitherto made are decidedly opposed to such an opinion. Dr. Prout thinks that the azote of the tissues in some instances may be derived from the air; and Sir Humphrey Davy states that in his experiments, an absorption of nitrogen took place during respiration to the amount of one-seventeenth of the volume of oxygen which disappeared from the atmosphere; so that in twenty-four hours the quantity of nitrogen absorbed was as much as two thousand two hundred and forty-six grains. Professor Pfaff, Priestley, Cuvier, Henderson, Edwards and others, obtained similar results, but Allen and Pepys, Berthollet, Jurine, Nysten, Dulong and Despretz, detected an increase of nitrogen. The discrepancy in these results is probably due to the different circumstances in which the experiments were conducted, and it seems very desirable that a further set of experiments should be made, when care should be taken to obtain if possible the amount of nitrogen received in the food, as well as by mastication and inhalation, and then the quantity exhaled in each case would be a valuable addition to our knowledge. It is the opinion of Prout and Liebig that in the digestive process, starch and other amylaceous and saccharine matters are converted into the oleaginous principles, by the extraction of oxygen; of which the former contains a much greater quantity than the latter."

We have quoted the above remarks at length on account of the importance of the topic on which they treat. The views of Liebig have been very generally adopted in our country without any hesitation; but in Europe among some of the ablest physiologists they are controverted. The same is also the case with respect to his theory of the nutrition of plants as we shall have occasion to show. While his theory and arguments have been diffused from abroad among our agriculturists, little or nothing hardly is known of the overwhelming array of facts which have been brought to bear against them by men of the most accurate science and practical men in Germany, France and England. The question of animal nutrition may still perhaps be considered a mooted one in certain respects, but some of its principles seem to have been settled adverse to his theory. Certain facts are entirely irreconcilable with his positions and these latter must therefore be modified to meet the former. The general points may be correct, but in carrying out the principles there is serious difficulty. We hoped to have been able to subjoin in an appendix a full treatise on the breeding of cattle, by the same author, whose essay we have already translated and placed therein; but as a part only of the original has come to hand, we must forego it now.

It is often desirable to determine the proportion of fat or tallow to the live weight of the animal, and various methods have been proposed and tables prepared to aid in this decision. One method accompanied by a table will be found in our Appendix, No. 14, among the papers heretofore mentioned. The importance of this subject has been earnestly pressed in a late No. of the American Farmer. The tables are made out in German measures, but as the foot and inch differ but little from the English ones, probably no serious difficulty need be apprehended from its application. It is probable, however, that considerable modification may be necessary to adapt it to different races or breeds of animals on account of the diversity of their form and structure. The general principles on which it is formed however, may deserve notice and may be useful in constructing others.

The importance of the general *economy of the stable*, especially as regards *construction* and *ventilation*, does not seem enough to be realized in our country. Stables are generally built too low and no care is taken to provide suitable ventilation. They should be at least twelve feet high, to allow the foul air to rise and escape. The temperature also, should be properly regulated; light should be allowed so that the eyes of the animals should not be subjected to being brought out of a dark stable into broad sunlight by which they are often greatly injured. The color recommended for the ceiling is stone color, which may be easily made by mixing lamp-black with the common whitewash. The walls of the stable, should be built hollow—the doors high and wide—the stall be six feet wide at least, and the sides high, and long enough to prevent the interference of the animals with each other. The stables and stalls of course should contain provision for conducting off the liquid manure, which for the greater part is now almost entirely wasted. Some excellent directions with regard to the construction of stables and the requisite fastenings will be found in the American Agriculturist. Other agricultural journals contain valuable suggestions on these important topics.

The *science* or *theory of cultivation* is one which, for a few years past has excited and is now exciting much attention in Europe and this country. Yet we suspect that in this country, even among our best informed agriculturists, there is great ignorance of the real state of the discussion abroad. Thaër, the great father of agricultural science in Germany, was a thorough practical man, and he showed by his wonderful success, that his views were not visionary. So has it been with Schwertz, Block, Köppe, Pabst, Burger, Veit and others. More recently, however, Liebig has appeared on the stage, controverting the former views, and his theories have called out earnest discussion. On the one hand he and his disciples have contended for the chemical system which would introduce an entire change in the modes of cultivation; while on the other hand, the best practical agriculturists of Germany will be found in opposition to many of his positions. The publication of his views in England and in this country has been extensive. Some, however, of the ablest writers in Great Britain have declared their dissent. Liebig may have been premature in the annunciation of his theories. As a chemist his reputation entitled his opinions on that subject to credit. As a physiologist and an agriculturist he has been successfully attacked, and many of his statements, or rather deductions, disproved. Among his opponents, Mulder in Holland holds a very high rank, and in the opinion of Berzelius, the great question between Liebig and Mulder relative to protein, a constituent in the vegetable economy, seems to be decided in favor of Mulder. Unfortunately for Liebig, he undertook to reduce his views relative to the nutrition of plants to practice, and compounded a kind of manure which he confidently believed would produce great results. We gave an account of this compound, together with Liebig's essay on the subject of manure, and a description of the process of preparing it for different plants in our report in 1845, and we have been not a little surprised to see the same during this year, more than two years afterwards, presented to the public in one of the largest agricultural journals of our country as something *entirely new*, which is likewise so important as to be worth the whole price of the volume even to our farmers. Liebig's manure, however, has been tried both in Germany and England, and cannot stand the test. His attempt to reduce his theory to practice has resulted in the most signal failures. And for this reason, among others, the best practical agriculturists of Germany discard his opinions. Many able publications have been given to the press in which this ground is taken. But while the writings of Liebig and Petzholdt his disciple, have been put forth to the agriculturists of this country, they know nothing of Hlubek, Lengerke, Schultz, and others of high reputation in Germany; of Lawes and others in England, who have taken strong ground against his views. We will just quote here the opinion of Dr. Lengerke, general secretary of the Royal College of Land Husbandry in Prussia, respecting the work of Petzholdt, which has been so greatly celebrated by some among us. It is contained in a review of recent agricultural literature in the Annalen der Landwirthschaft in den Kŏniglich Preuissischen Stadten. He says, after mentioning the popular lectures of Dr. Alexander Petzholdt—"This book is an epitome, and partially a further carrying out of Liebig's views, in which we meet with a multiplicity of wholly gross blunders against established facts in agricultural practice. Though the author, for example, teaches that plants only need inorganic things which may restore the elements exhausted, as ashes by burning; that animal manures can only be efficacious, sometimes, in consequence of a considerable formation of ammonia which takes place; that there is no reason of any kind to imagine the means of nutrition existing in the atmosphere (as carbon, hydrogen, oxygen and nitrogen) insufficient for the success of plants under cultivation; though he broaches more and more of these and similar extravagances, no agriculturist of common sense, whether he regard scientific education ever so highly or ever so meanly, will be induced to cease taking all possible care of his dunghills, and will still acknowledge the enriching of his soil by means of organic substances as justly the highest aim of his efforts." Dr. Lengerke then refers to the Agricultural Chemistry of Prof. Franz Schultz as one of rare merit. In the same review we find the following character given to Mulder's work on Physiological Chemistry; "a work that men of the profession consider the most admirable which our literature has bestowed on this branch of science, and which supplies the most highly important contributions to the doctrine of the nutrition of plants. This is incontestibly sustained by observation and experiment. As characteristic of the book, we will only here add, that the author rejects the idea of the existence of an universal power which governs the organic structure, the so-called vital power, as finding no confirmation by experience. Every change of substance in the organic kingdom, like that in inorganic nature is the result of the inherent powers of the elements and need be ascribed to no other cause."

We may likewise refer here to an *essay* published in the Royal Agricultural Society of England, by John Bennet Lawes, *on agricultural chemistry*, in which he comes out very decidedly against the theory of Liebig, as contrary to well established facts. This essay is pronounced, by the able editor of the London Gardeners' Chronicle, to be the most important paper that has appeared in England, on this subject, for many years, and one which he thinks may have great influence on the future agricultural improvement of that kingdom. We should be glad, if our space allowed, to subjoin the whole essay in an appendix; but we must content ourselves with quoting a portion of it. After giving some account of the progress of agricultural chemistry and alluding to the labors of German and French chemists in organic chemistry, he says, alluding to Liebig and Boussingault: "Without entering into the merits of the different opinions maintained by these distinguished chemists, I may here observe, that many of the errors into which Liebig has fallen, have, I think, arisen from his not sufficiently considering what agriculture really is. *Practical agriculture consists in the artificial accumulation of certain constituents, to be employed either as food for men or other animals, upon a space of ground incapable of supporting them in its natural state.* If Liebig had sufficiently considered this distinction, he would not have assumed that certain substances, employed as manures, are of little value, because plants and trees, in their natural state are capable of obtaining them in sufficient quantity for their use. The great problem to be solved as to manure is, what substances is it necessary to supply to the soil in order to maintain a remunerative fertility? The solution of this question appears easy, regard being had only to the composition of the crops removed. Practically, however, there are great difficulties attending it, which can only be entirely overcome by a long series of careful and costly experiments. If the ash theory, advanced by Liebig and so industriously propagated by his pupils, were founded on truth, careful examination of the ashes of plants and a few simple calculations upon the amount of mineral substances exported from the soil in corn, meat, &c., would at once enable us to explain and remedy the exhaustion of our soils. The farmer, when he sends his load of wheat to market, would bring back the few pounds of minerals which the wheat contained, and the return of these to the soil would enable him to produce the same amount of wheat for market the following year. Unfortunately, however, the ground-work on which this theory is raised, is unsound, where agriculture, as distinct from natural vegetation, forms the subject of consideration.

Agricultural plants, which practice has shown to differ widely from each other in their respective relations to soil, climate, &c., manuring and position in rotation, possess, at the same time, widely differing powers of reliance upon the atmosphere for the constituents which it is known to supply in a greater or less degree. If grain crops hold the same relation to natural and artificial supply of their organic constituents, as the leguminous plants and turnips, the farmer would not require the assistance of the latter crops; but since compared with these the grain crops, in some important respects are far more dependent upon artificial supply to the soil of certain organic constituents, of which the price is high and the supply limited, it becomes necessary to employ certain plants, which possess the power of collecting these ingredients from the atmosphere, and such a procedure constitutes a rotation of crops."

After a variety of interesting remarks, Mr. Lawes comes to speak of the distinction between organic and inorganic manures. He describes the operation of each, and remarks, that the atmosphere may be considered the natural source of organic and the soil that of inorganic supply. "It is the object of agriculture to increase the produce of the soil beyond its natural yield, which can be done by various means." He mentions fallowing, in which the natural produce of the soil, for two years, is concentrated into one; the repeated exposure of the soil to the atmosphere by means of ploughing, causing a decomposition of mineral matter, while the ammonia of the rain unites with the various acids in the soil. Manures also, may supply those ingredients which the soil and atmosphere are incapable of yielding in sufficient quantity. He adds,—"It has been argued by Liebig that the atmosphere can supply the ammonia from which plants derive their nitrogen, in sufficient quantity for agricultural purposes; and his views on this subject have been echoed through England by a host of his followers. This point, on which so much difference of opinion exists between the French and German chemists, is perhaps the most important to agriculture which chemistry can solve. It affects the whole economy of cultivation, and the final solution of it must very materially influence the action of all practical agriculturists. With regard to the most important crop, (wheat,) my own experiments are so decisive, and through the whole series the results are so uniform, that it is hardly possible to have two opinions on the subject, and what is still more, they are in accordance with the dictates of reason and the practical experience of agriculture." He goes on to give an account of experiments in the employment of various mineral manures and the results. The conclusion to which he comes is this: "The absolute necessity of supplying nitrogen to enable the soil to produce more wheat than it could do in a natural state, is so apparent throughout this series of experiments that it is difficult to entertain the slightest doubt upon the subject. So long as any available ammonia exists in the soil, so long will mineral manures increase the produce of wheat. The various contradictory results obtained by the application of mineral manures to wheat are completely accounted for, when it is known that they only increase the produce in proportion to the available azotized matter existing in the soil." He calls the whole class of plants of the natural order to which wheat belongs, nitrogen-consuming plants, in contradistinction to the nitrogen-collecting plants. He adds,—"The theory advanced by Liebig, that the crops on a field diminish or increase in exact proportion to the diminution or increase of the mineral substances conveyed to it in manure, is calculated so seriously to mislead the agriculturist, that it is highly important its fallacies should be generally known. The contempt which the practical farmer feels for the science of agricultural chemistry arises from the errors which have been committed by its professors. They have endeavored to account for, and sometimes to pronounce, as erroneous, the knowledge which ages of experience have established, and they have attempted to generalize, without the practical data necessary to accomplish their end with success. Agriculture will, eventually, derive the most important assistance from chemistry; but before it can propose any changes in the established routine of the former, it must, by a series of laborious and costly experiments, explain this routine in a satisfactory manner." Again: "It is not very difficult to arrive at a correct knowledge of the action and value of artificial manures. They are generally composed of two or three ingredients in a state of concentration, and are far more rapid in their action upon plants than the manure which is produced by animals. They can therefore be applied with greater success to those crops which are required in an artificial condition and the growth of which cannot be too vigorous."

"If there be any truth in my experiments, all hope of obtaining annual crops of corn (grain) by means of mineral manure must be forever abandoned. The employment of potash, soda, magnesia, and silica have been suggested by chemists from an imperfect knowledge of practical agriculture. Having found these substances in the ash of the plants, they have concluded that the soil cannot supply them in sufficient quantity. I could bring forward a great number of experiments tried at my suggestion upon various soils which would prove that alkaline manures were quite incompetent to remedy the exhaustion from which they suffered; but the general practice of the best agriculturists is more convincing than a thousand such experiments." He supposes the case of a soil by successive crops exhausted of its alkalies to the greatest extent possible, yet it may in a few years be brought to a high condition without imparting to it a pound of potash or soda. "The only mineral which under a proper system of agriculture, it is necessary to restore directly to the soil is phosphate of lime." Mr. Lawes' whole essay is one which deserves the careful perusal of every agriculturist who wishes to see the important subject of which it treats clearly discussed. Mr. Karkeek, also a distinguished lecturer in England, seems to take a similar view of Liebig's recent doctrine, for after giving an account of a variety of experiments, the report of his lecture proceeds: "Mr. Karkeek then adverted to the doctrine recently introduced by Prof. Liebig, which under-estimated the influence of organic manures in the soil, and attached the more importance to the inorganic constituents of plants, by keeping up a supply of which in the soil he is of the opinion that the carbon and nitrogen which are necessary for the growth of the plant will be supplied by the atmosphere. This is a theory altogether opposed to the experiments which he (Mr. K.) had placed before them that day, and it was also opposed to Liebig's previous teaching. They might rely upon it that the inorganic elements were of little use in a soil as food for plants without a corresponding supply of the organic. The reason that guano answered so well, was because it contained (like farm yard dung) all the elements which plants require; and putting either into the earth restored those substances which plants abstract from it, and which are necessary to their growth."

We have before adverted to the view entertained by Thaër, and which, in a modified form, is still maintained by the ablest German practical agriculturists. Below we will give a comparative view of Liebig's system as distinguished from that of Hlubek. We will first, however, advert for a moment to a work by Prof. C. H. Schultz, who, from doubt as to the carbonic acid theory of Liebig was led to repeat the experiments falsely explained by Boussingault, Dobereiner, and Griesbach, and others, as to whether the acids naturally existent in the vital juices and parenchym of the plant and the acids or oxydized substances, might furnish the oxygen thrown off by plants in the light. From the experiments, and as the result of his former investigations, he drew the conclusion that this is the true theory of the nutrition of plants; that the azotized humus is converted by the digestive operation of the roots in their vicinity into certain substances. These substances are the gummy juice of the wood, sugar, and the different vegetable acids in the various plants, of which the most common is lactic acid. But besides there are malic acid, citric acid, tartaric acid, acetic acid, and acetates of these acids. Sulphur and phosphorus form plants likewise by the decomposition of phosphates and sulphatic carbonates by means of oxalic acid. In the Handbuch für Angehende Landwirthe, we find a full statement of the theories of Hlubek, and Liebig, and the whole is summed up by a comparison in parallel columns of the great points maintained by each in reference to several important particulars of the theory of the nutrition of plants, &c. Hlubek may be considered the advocate of modified humus theory which Thaër so earnestly supported, and which has been the admitted system of Sprengel and all the celebrated agricultural writers in Germany, as well as Sir Humphrey Davy and others in England. The following is the comparison alluded to:

Comparison of the Theories of Hlubek and Liebig.

The main points in which they differ are the following:

I.—*In respect to the supply of Plants with Carbon.*

HLUBEK.	LIEBIG.
Plants obtain this elementary substance in the form: 1. Of carbonic acid which exists in the atmosphere and which is formed by the putrefaction of dung and humas. 2. Of humates, also of dung and humus extract. 3. Of carbonates, especially of carbonate of lime, which appears to decompose the strong roots of some plants (lucerne, sainfoin, the vine, &c.)	1. The carbon in plants comes exclusively from the atmosphere, which is produced by the process of respiration and combustion. 2. The carbonic acid of humus contributes to the nutrition of plants only by process of germination.

II.—*In reference to the amount of Carbon obtained in a given extent.*

The greatness of the product of carbon is, up to certain limits, in a direct ratio to the quantity of the organic remains. Thus for example, in rape, turnips, beans, &c., the product is always in a direct ratio to the quantity of manure employed.	We may on one and the same soil, *whether it be manured or not* from a given extent, obtain *an equal amount of carbon.* Or the quantity of carbon in one and the same soil of a given extent, remains constant, whether we cultivate forest trees, grasses, hoed fruits, the cereals.

III.—*In respect to the supply of Plants with Nitrogen.*

1. Plants receive nitrogen in the form of ammonia, *especially from the nitrates*, since the land cultivated may in a certain degree be considered as a nitrogenous or azotous plantation; the ammonia contained in the atmosphere, is too trifling to take into consideration in manuring.	1. Plants receive nitrogen from the ammonia of rain water, and this ammonia is derived not only from the putrefaction of organic bodies, but it is also in part a constituent part of the body of the globe. 2. Animal manures operate only by the formation of ammonia.

IV.—*In reference to the efficacy and operation of Manure and Humus.*

1. The direct *efficacy* of manure (stable manure) and of humus consists in the attraction. *(a.)* Of carbon in the form of carbonic acid and extract of humus, or humic acid and humates. *(b.)* Of nitrogen in the form of ammonia and nitrates. *(c.)* Of sulphur, in the form of sulphuric acid gas and sulphates. 2. The *indirect* consists: *(a.)* In the loosening of the soil, promoting the entrance of the atmosphere as well as the spreading out of the roots.	1. Manure and humus have no part in the carbon of the harvest. 2. Animal manure operates only by the formation of ammonia, whereby plants are furnished with nitrogen. 3. The solid excrements can exert no efficacy in vegetation with the nitrogen which they contain; but 4. The proper effect of the solid excrements is limited to the inorganic matter, (constituents of plants.)

HLUBEK.	LIEBIG.
(b.) In the ascent of the warmth of the land, in consequence of fermentation and of its dark color. *(c.)* The increase of the capacity of absorption of the atmospheric moisture.	

V.—*In reference to the efficacy of the Inorganic Constituents of Plants.*

1. The efficacy of the inorganic constituents of plants as well as of the soil, is confined simply to an indirect influence which depends especially on their physical properties as cohesion, adhesion, capacity for heat and reception and retention of water. 2. The geographical extension of the cultivated plant is dependent simply on the degree of warmth and moisture, and luxuriant growth, on the directly nutritious substances (manures in the proper sense) and a careful preparation of the soil.	The inorganic constituents, viz:—silicates, carbonates and phosphates—form not only the nutrition of plants, but they also play so important a part, that as above mentioned, the peculiar efficacy of the solid excrements of the domestic animals is confined to the supply of the inorganic substances.

VI.—*In reference to the efficacy of Gypsum.*

Gypsum acts directly with the sulphur which it contains as a means of nutrition, and indirectly as the nitrogen of the ammonia developed by the putrefaction of manure to the plants, is attracted in the form of sulphate of ammonia; the sulphur of the gypsum in the ground rich in humus, and so forming much carbonic acid, although no longer exhibiting ammonia, is attracted to plants in the form of sulphuric acid gas. Besides, it produces a marked effect only in the leguminous plants, while it attracts to the same the sulphur required to form legumin.	Gypsum fixes the ammonia of the atmosphere and supplies plants with nitrogen.

VII.—*In respect to the principles of the rotation of crops.*

1. We should use the atmosphere and the soil as carefully as possible as the grand lever of the production of plants. 2. Choose plants of different organization, especially in reference to the extent of the tops and the strength of the roots for a rotation. 3. Shady fruits should be interposed between those not shady, in order that the soil may not become	1. We cultivate a plant as long as it meets inorganic substances in the soil; when these are exhausted then we cause to follow a plant which may take up the inorganic constituents remaining, for example the grapes after the pod fruits because the latter take up only a small quantity of phosphates and leave to the former the alkalies. 2. If the collective inorganic bodies are exhausted, then it is left fallow,

HLUBEK.

hard, and the weeds get the upper hand.

4. There should be a definite proportion between winter and summer crops, between those directly and indirectly commercial plants, in order that the danger of failure may be lessened, the labors uniformly divided, the exhaustion of the soil covered, the domestic animals be nourished according to their nature, &c.

5. As in plants we can find no organized excrements analogous to those of the organic animals, and these are confined solely to evaporation, therefore the rotation of crops is not based on the *mere* excretion of plants, but on the grounds above mentioned.

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for it is a process of disintegration by which the plant is again supplied with inorganic substances which were drawn out by the plants—or we may manure, for manure supplies as above mentioned the silicates and phosphates.

3. If the fibres of the roots are burdened with excrements, then the plants die; we must tear up the soil and cultivate other plants until the excrements of the plants that preceded are perfectly decomposed, when they can be again planted on the same field. (Liebig attaches peculiar value to the still very problematic excretions of plants.)

In the Southern Cultivator for March, 1847, we find an able article which discusses the errors of Liebig's views, and points out the grounds of them very clearly. We can only refer to it, but would commend it to the perusal of those who wish to see the subject very properly treated. With a few exceptions it is the only article we have seen in the agricultural journals of this country, but what seem to admit his whole theory. The writer's remarks also on the true province of agricultural chemistry, and the aid to be derived from it, are pertinent and deserve attention. He says, speaking of the natural sciences: "to hold them up as a means by which the young farmer is to conduct his business most profitably, while he yet remains wholly or partially ignorant of the improved systems of modern practice and management, cannot be followed by the best results. The most important knowledge must be first attained, and afterwards that which is less essential in practice." Still we should avail ourselves of the many valuable suggestions which chemistry offers for trial and practice, as Prof. Johnston very justly remarks: "It is foolish to refuse to avail ourselves of the morning light because it is not equal to the mid-day sun."

In his late preface to Mulder, Prof. Johnston (with reference to the ash theory) after adverting to the fact that the ash of a plant is an assemblage of many and various parts, says: "What exact truth can the analysis of such an ash teach us? It may be supposed, or may be found to possess, some rude agricultural value, but exact physiology must by and by dismiss all such empirical results; and refined agriculture will journey side by side with refined physiology. The useful, though introductory, and as it were tentative results of our past analyses, will give place to more patient and minute researches, such as those to which the present work points the way."

Some very interesting discussions respecting *farm yard manure*, are contained in the English agricultural journals. We are able to advert only to a few points. In a lecture of Mr. Nesbitt, before the London Farmers' Club, he remarks:—"In the preparation of farm yard dung there are two or three points worthy to be observed. The *first* is, that many of these substances are soluble. Now, the common way of preparing farm yard dung, every body is acquainted with: a large mass of straw and excrement is allowed to rot in the midst of a quantity of water, where, instead of a genial heat being produced, it is washed by the water, which, saturated with soluble matter, is allowed to run away, as if the farmer intended to wash his manure to make it clean. Now it so happens that every where those substances which are most valuable, are most easily lost. A quantity of dung thus exposed to the action of the water, will lose its potash, its soda, the greater part of its ammonia, its soluble salts of lime; in fact only the insoluble and comparatively worthless parts will be left behind. There are many ways of making manure heaps. Perhaps the best way is to make layers of animal excrements with straw on a mould bottom; to lay thereon a foot or so of manure and straw, a little gypsum over that, and sometimes a little mould; then another layer, and so on, covering the whole with six or eight inches of ditch stuff."

With reference to the *application of manure*, he says:—"It is evident that you ought to apply the greatest quantity of soluble matter to those plants which grow the quickest. You ought to apply the substances which are most soluble to those plants which take out manure most quickly; you ought to apply those substances which are least soluble to those plants which take out the manure most slowly. Now, applying these rules, you will perceive that within certain limits the more your manure is decomposed the more soluble it becomes. When you first lay it down, it is nearly insoluble, but by the continuous action which takes place, the various substances are rendered much more soluble, so that it will act much more quickly. Therefore rotted dung ought rather to be used for those plants which you wish to grow quickly, and dung not so much decomposed for plants of a slower growth. Now there are different times of the year for putting manure on the land. Some will put it on in summer and leave the action of the air for the winter. The good effect of that will depend a great deal upon the dung itself, and the rain which falls in the succeeding months. If you put on your land well rotted dung, and expose it during three or four months of winter to the action of the water and the air, I have not the least hesitation in saying that the soluble portions will be exceedingly liable to be washed away from the soil. On the contrary, if you put on in the frost long dung, you will not be so likely to suffer loss, because the dung is not yet sufficiently decomposed to contain much soluble matter."

He urges strenuously the importance of gathering all kinds of manure, and observes that the first duty of the farmer is to prevent on his farm the loss of any substance which can, by its decomposition into manure, reproduce vegetable life. He then strongly recommends the use of bone dust, and, in minute quantities, nitrate of soda, sulphate of soda, and common salt. Silica, also, in small quantity, may be used to give strength to the straw of wheat, &c. He considered one ton of dung which has been rotted more valuable than a ton of fresh dung, because it had a greater effect. The reason of it is this: In the general action of the decomposition of manure, the ammonia was retained and the whole was reduced into less bulk. They had double the amount of mineral ingredients, double the ammonia; they only lost the carbon and the hydrogen. He had never yet heard of an instance in which well rotted dung did not, on trial, prove more valuable than fresh dung. In reference to some misunderstanding of his view, he also added:—"I maintain, as I did before, that a ton of dung which has been rotted is far more valuable than a ton of dung which has not been rotted'

This question as to the application of manures, fresh or rotten, is also well treated in Gerardine's essay on manures. He says:—"The long or fresh manures which occupy much space, have a more prolonged and durable action on vegetation than the short, so that they are applied to plants which remain a longer time growing, to strong, compact and clayey soils, which they render light by their fibrous structure. The short manures, which are heavy and compact, exercise an immediate action on plants, but this action is less durable, and hence these are applied to plants which remain only three or four months on the ground and to light soils. Indeed the long dung is used in a state in which it is less easily brought into solution, and the short manures are in so advanced a state of decomposition as to have lost a great part of their fertilizing properties, which have escaped into the atmosphere in the shape of gases and vapors."

In reference to their chemical composition, he adds:—"Fresh manure, which has undergone scarcely any fermentation, contains the following substances: Water, seventy-five; soluble, vegetable and animal matters, and soluble salt, five; insoluble, vegetable and animal matters and insoluble salts, twenty; vegetable fibre and straw, one hundred." Boussingault represents the composition of farm yard manure after six months, which he calls ordinary dung: Water, 79.3; organic matters, 14.03, salts and earths, 6.67=20.7=100.00. According to Boussingault, dung reduced by a long continued fermentation to a pasty brownish black mass, or black butter, has the following composition: Water, 72.20; organic soluble matters and soluble salts, 1.50; insoluble salts, 10.27; straw, converted into peat, 12.40; finely divided peaty matter, analogous to the foregoing, 3.63=100.00 Richardson obtained a slightly different result from the analysis of an average specimen of manure in the state in which it is spread on the land: Water, 64.96; organic matters, 24.71; mineral matters, to wit: sand, 3.20, soluble salts, 1.34, insoluble salts, 5.79=10.33=100.00. Fresh manure, then, contains one-fifth of its weight of insoluble matters, which can only serve for the nutrition of plants, when converted into new soluble compounds, into carbonic acid and ammonia. Now, in order to effect this change, a fermentation is required which can only take place fully when collected into a large mass. If then the dung be spread on the land immediately after it comes from the stable, this necessary fermentation will be imperfectly performed in the soil, so that a greater part of the manure will remain inactive, and the change of the vegetable fibre into nutritive matter goes on very slowly. But if a slight degree of fermentation, capable of destroying the cohesion of the vegetable fibre, predisposing it to decomposition and solution, is useful to manure before spreading it upon the land, a long continuance of the same action will prove to be injurious, as is seen in the heaps of manure of our farms. Under these circumstances the mass becomes strongly heated, numerous chemical reactions take place, the constituents are completely decomposed, an abundant disengagement of gases takes place, and a dark colored liquid is formed. Dung thus loses twenty-five per cent. of its original bulk, so that one hundred cart loads of fresh manure are reduced to seventy-five. The gas disengaged consists chiefly of carbonic acid, carburetted hydrogen and ammonia, the useful effects of which are lost.

Davy made a curious and convincing experiment on this head. He filled a retort with dung and placed the neck among the roots in the border of a garden. In less than a week its influence was visible; the grass presented a forcible contrast to the remainder of the turf, and vegetated with extraordinary rapidity. Besides the dissipation of the gas there is also a loss of heat, which if developed in the soil, would excite the germination of the seeds and aid the growth of plants. In the fermentation which these substances undergo when buried in the soil the gases come in contact with the roots as fast as they are generated. They are therefore warm at the moment when they are absorbed by the roots, and are thus much more efficacious than if the manure had been allowed to putrefy before it is used. Agricultural works are full of facts which accord with this view. The celebrated Thaër took great pains not to allow the manure to accumulate in heaps, and to convey it to the land as often as the season would permit. Hassenfratz manured two similar lands, one with long dung in which the straw had only commenced to putrefy, the other with perfectly decayed manure capable of being easily cut by the spade. These two pieces of land were cultivated and sown in the same manner; the second produced larger, stronger and more vigorous plants the first year than the former; but the second year when neither was manured the former produced larger and stronger crops than the latter, the third year the former still had a slight advantage over the latter. The conclusion from the foregoing is clear enough; that when we desire to influence a succession of crops we must employ not the decayed manure, the action of which is ephemeral, but the long and fresh, which moreover has the advantage of giving heat to the soil, of removing acidity, of awakening and bringing into action the force of the residues of former manures which have hitherto resisted decomposition. 'An experience of more than seven years,' says Pictet, 'has convinced me that we shall be great gainers by using manure as soon as it comes from the stables.'"

In the Journal d'Agriculture Pratique, there are some very excellent remarks on the foregoing topics by M. Villeroy, contained in a sort of series of agricultural maxims, which may be profitably quoted here on the general topic of cultivation, and we have accordingly translated them for this purpose as we have never seen them in English before, and they comprise much in a small compass. These observations are a kind of introduction to an article on the properties and uses of water in the cultivation of plants. The subject of irrigation is one which is exciting much interest in Europe as well also as that of draining, and there are many interesting passages on these particular branches of the general one which if we could find space we should like to quote, but we must forego that pleasure at present. M. Villeroy is a practical agriculturist, and stands high as a writer in the French agriculturist periodicals:

"Crops are always in direct proportion to the manure which the farmer uses.

It is not the largest area which gives the most profit, but that which is best tilled and especially the best manured.

A small farm well cultivated and well manured will give a greater clear profit than a large one, where the same labor and the same quantity of manure is employed on a greater extent of surface. Manure is the basis of agricultural prosperity and success. With a sufficient quantity of manure, the most arid and unpromising soil may be made fruitful and abundant in crops.

Of all manures there is none so valuable or important as stable manure: it agrees best with all kinds of fields and plants and modes of culture.

Even if other more energetic manures be employed, this cannot be wholly dispensed with, and they should be used rather to augment its action or replace it. Those manures are not in sufficient quantity or so universal as to supercede the use of stable manure—and as a general thing cultivation would be impossible without the aid of this latter.

In the same degree as the product depends not on the area, but on the culture and quantity of manure, does the greater quantity of manure depend not on the greatest number of animals but on the greatest amount of fodder consumed.

Animals produce nothing of themselves—they only transform the fodder, they consume into manure; part of it is assimilated for their sustenance and a part becomes excrement or manure. The more nourishment is given to beasts the more fertilizing is the manure.

A lean beast makes less manure than a fat one—a well fed one gives twice as much as a poorly fed one.

Since, then, the success of agriculture depends on the quantity of manure produced, and this again depends on the quantity of fodder consumed, it follows that the greatest quantity of fodder consumed in the management of the farm insures the most solid prosperity.

Whenever much and good fodder is produced, there is also produced much good manure, and whenever there is a sufficient quantity of manure, there will be rich and abundant harvests.

Generally the energy of agricultural management may be judged of by the amount of cultivated fodder on which it is based, and its progress in the production of fodder should be regarded also as the progress of the farming.

Notwithstanding the extent of artificial meadows, and the perfection which has been obtained in the root culture and of the fodder-plants, meadows which are overflowed always hold the first place. They do not consume manure, and yet they produce much. Green plants contain seventy-five per cent. of their weight in water, and this is formed of oxygen and hydrogen, which are also the basis of vegetable matter, and furnishes plants with a portion of the carbonic acid which they need.

Water also may contain sulphur, lime, and other salts, the greater part of which are decomposed and absorbed by plants.

Water also deposites slime, which fertilizes—it carries off a large quantity, likewise, of other fertilizing particles, unless these are arrested by the hand of culture, and turned to use. The amount of earth thus carried off is vast. According to Rennel, the Ganges every hour deposites at its mouth 2,509,056,000 cubic feet of earth, the Nile 14,784,000, and the Mississippi 800,000. This is the origin of the rich deltas at the mouths of some large rivers.

It is a singular fact that the Goths and Vandals, &c., who destroyed the temples and other monuments of Italy, respected the structures destined to agriculture, aqueducts, &c. After peace they dug out canals, &c. The Moors promoted agriculture in Spain.

Water nourishes plants.—Water contains fertilizing principles, even that of the most limpid fountain, and motion is necessary to disengage them. A meadow is enriched more where the declivity is marked than otherwise. The want of declivity may be supplied by the increased quantity of water; this gives greater motion to the water. If from want of declivity water remains on a meadow in a small quantity, part is absorbed, part evaporated, and it produces but little effect. If there be too large a quantity to be evaporated it forms acids, and destroys the plants, and produces miasmas.

If on the borders of a ditch is seen copious and thick herbage, but it is poor at a little distance, it is proof that it is badly managed. The evil may be corrected by giving greater declivity to the soil, and thus the same water will irrigate and fertilize to a greater distance.

If there be but little water, as usual with springs, too great declivity cannot be given to the soil, and thus the effect is increased. Such is not the case with a great quantity of water, for if the declivity be great the stream carries off not only fertilizing particles but the earth also, and leaves bare the roots of the herbage.

Water stimulates vegetation.—In meadows which are irrigated, the pores of the leaves of the plants are larger than in the same not watered. They are supposed to possess greater powers of absorption, by having their vital power increased and thus absorb more gas from the atmosphere.

Water is a solvent.—Without a sufficiency of it manure cannot ferment and decompose. It acts mechanically, divides and dissolves the manure on the surface of the earth, and renders it into a state to penetrate and reach the roots of plants.

Water protects and preserves plants, from heat and cold.—While water runs on a meadow it preserves the same temperature. If frost seize on the plants, the fatal effects may be prevented by watering them before they freeze.

Water is a means of freeing meadows from insects and hurtful animals, mice, moles, &c.; also moss, briars and noxious weeds."

The system of *deep ploughing*, thus turning up the subsoil, is becoming better understood and practised upon. There are many plants which require the soil to be stirred and loosened, and the roots of which, if there be no obstruction, will penetrate deep for their nutriment; and when the upper strata of the soil is partially exhausted, by turning up that which lies beneath, the elements necessary to sustain the vegetable life may be obtained. A correspondent of the London Gardeners' Chronicle, alluding to this subject, and its great importance in a system of husbandry, and in connection with manuring deeply, says—"I have found the roots of the Swedish turnip five feet below the surface on which its bulb was growing and all around it to the distance of three or four feet, the fibres of the root to a lesser depth had completely permeated the soil."

This object of deep cultivation has led to the invention of numerous ploughs, which cut a furrow much further into the earth, and the success which has attended experiments of the kind, with reference to a variety of products, encourages the idea that were the practice to become more universal, it would add greatly to the amount of the crops which are now gathered. Many fields which now present a sickly appearance might thus be made to wear a green and healthful aspect; and the additional labor would be recompensed by increasing stores of the fuits of the earth. There is a hidden richness even in comparatively exhausted soils, which it needs only the rightful application of the true principles of culture to bring out and impart to the various plants that belong to a well chosen rotation of crops. Our countrymen may be slow and unwilling to learn the benefits which might accrue by these improvements; but eventually it is believed that they will understand them and avail themselves of all that both science and practice may suggest for the enriching, ameliorating and fructifying the soil. For a kind of plough for cane cultivation, see Appendix, No. 18.

It may be proper to allude here to the varieties of *seeds* which have been, and are yet to be *distributed from this office.* Efforts have been used to secure a valuable collection, and it is believed that with proper care they will not disappoint the expectations. It is not surprising that in many instances the seeds which have gone from the Patent Office may not have germinated. This might be the case and yet result from no fault of the article. Careless planting; neglect of cultivation; unseasonable weather, and a variety of similar causes, may influence the success of them. But in many instances it is gratifying to know, that where they have been planted with attentive care, watched and properly treated, they have proved to be the means of introducing valuable products into parts of the country where they had not been known, and thus furnished a higher standard of culinary vegetables or field fruits which has exerted a beneficial influence for years. Some of the articles which are expected from Europe have not yet arrived, but it is hoped that they will be soon here, and in time to be tried the coming season.

We may also advert here to *samples of wool* prepared on cards and embracing the best varieties in Prussia and Germany, which are to be sent one to each state, as standards for the wool growers of our country. They were procured by Mr. Fleischmann in Europe, in circumstances of unusual advantage, and it cannot be expected that a better selection can be made for many years to come, as they have been derived from the choicest animals of the most celebrated flocks in that whole country where so much attention has been paid to this great branch of husbandry.

These collections of seeds and specimens show what might be done were a more organized plan adopted for the purpose, and how greatly our country might be benefitted by a small outlay of expense, aided by unceasing attention to the objects. It is by watching every new discovery in the field of agricultural improvements, and seizing upon the developed elements which have just started into being, and applying them for the benefit of our fellow-countrymen, that we believe much may be accomplished in this wide domain with which the interests and welfare of so many millions are deeply identified.

In the circular sent from the office there were several particulars on which we had hoped to have been able to furnish some information embodied in comparative tables and deductions; but owing to the want of sufficiently extended attention to them we have concluded to omit them. Yet a word or two may not be amiss on these subjects, also as indicative of what might be accomplished by the co-operation of the friends of agriculture.

One question presented related to the *proportion of cultivated to uncultivated land.* Some of our correspondents have furnished satisfactory replies, and although there exists great disparity of the returns in the different states, and even in the same state, yet enough is to be gathered from what we have had made known to us to lead us to believe that if similar responses had come from every state, and from more sections of those states respectively from which we have heard, we might have derived interesting comparative estimates from the same. The replies respecting the *quantity of seed used*, the *average product per acre*, the *time of harvesting* or *gathering*, the most approved *rotation of crops*, are more complete so far as they extend; but unfortunately here again, from some of the states no answers have been received, and the replies therefore could only embrace some few of the states; so that we must forego the execution of our purpose to make the above particulars the subject of special comment.

We throw out here, however, some hints respecting topics which it is desirable to have embodied in our agricultural reports throughout the country, and to which we could wish the attention of agriculturists in every part of our land might be directed in their correspondence with the agricultural journals. We are convinced that thus an immense amount of important information might be secured. State legislatures would no doubt confer a benefit on the whole nation, as well as on their individual constituency, were they to procure as much of such information as practicable and annually spread it before the people; and it is certainly not unworthy the attention of our National Congress.

It is desirable then, not merely to obtain the amount of population, but so far as practicable the quantity of land cultivated for each crop, the probable amount of home consumption of the crops raised, whether for sustenance of man or stock, or of manufactures and their respective values. The proportion of animal to vegetable food, &c. In arranging the crops which are staple to our country, we may classify together those which are mainly used for human food, as the cereals; those which are used for the food principally of animals, though also at the same time used for human food; those which are used exclusively for the food of other animals besides man; and plants which are used for industrial pursuits, or purposes of trade, and not for food. This class of plants is termed in the German books, commercial plants, and embraces those which are raised for their fibrous texture, or the spinning plants as they are called; the oil plants; the drug or dye plants; and arrangements and deductions might be made with reference to these which would furnish many interesting particulars and help us more fully to understand the capacity of our country, when once its immense agricultural resources shall be developed, to supply the world.

In reference also to the effect of their cultivation on the soil, there might be another and a useful classification, such as that of plants which *exhaust* the soil, those that *enrich* the soil, and the proportion in which these of each class are raised throughout our whole country. Some regard has been paid to this mode of estimate in France and other parts of the European continent. The close connection of this subject with the various theories of cultivation and nutrition of plants renders it at this period—when so much attention is turned to the topic by our scientific and practical agriculturists—an interesting matter of investigation.

Among the topics of discussion which occupy the attention of European economists in reference to agriculture, and on which we often find many useful thoughts in their writings, are the causes or *difficulties* which lie in the way of improvements. They are classified differently, but one of the most common arrangements we have met with has suggested to us the following observations, which embraces part of theirs, and others we have added. Some of the specifications in European countries do not apply to our own.

The difficulties therefore, in the way of improvement may be classed under the following heads:

I. The nature of the soil, location, &c. The remedy for these, so far as they can be remedied, is evidently the greater skill in adapting the crops selected to meet the difficulty and more science and skill in mechanical cultivation.

II. From want of materials to enrich it: and here also it is very easy to suggest the remedy, but more difficult to make our countrymen so far feel its practicability as to apply their energies to use it. The modes of cultivation are so wasteful, so much is suffered to be lost that might be saved, mines of wealth as it were lying about their streets and farms and plantations, in every shape and form that might be turned to enrich the soil and make it far more productive.

III. From the climate, embracing here the temperature, moisture, &c.; more careful observations, comparisons and deductions on this subject are desirable and this element deserves far more attention in the selection and adaptation of crops, than is often given to it.

IV. The want of market or communication. The influence of this in our country is daily becoming less by the operation of extended lines of rail roads, canals and telegraphic lines. More will probably also be done in respect to gathering and diffusing knowledge of the prices of agricultural products and the demand for them, so that in every part of our country a good acquaintance with the state of the market at home and abroad will be enjoyed.

In the circular sent from this office was likewise embraced the price of the different articles cropped or raised, and the answers received show that only wider co-operation is needed to secure much useful information on this subject.

The *influence of railways on agriculture* has been brought before the agricultural conventions of Europe as a topic of commanding interest taken in this kind of stocks; much information has been collected by a committee of the House of Commons, in reference to the effect of railways on agricultural improvement. Among these is the testimony of James Smith of Deanston, well known as the advocate of draining, and a successful agriculturist as well as the author of divers works and communications on the subject of farming, in the agricultural journals of England. As this embodies so many facts which bear on the question, we shall quote from it at some length. He says: "I have observed upon those lines which have been in existence for some years, that a very great improvement of the lands in the neighborhood has been the result, arising mainly from the cheapness and facility of transport, and I have drawn out some tables to illustrate that. I have one table taking a farm of two hundred acres, and a six course shift. I have taken this farm upon the six course shift which is most suitable for the bulk of the medium of England and Scotland. I have supposed that farm to be in most full cultivation, thoroughly improved, and to be both arable and pasture. I have taken the quantities of green and dairy produce and cattle, &c. Every thing which I can conceive will be expected from that farm; and it amounts to one hundred and forty-eight tons. I have then taken the imports, consisting of store cattle to be fed, lime and other matters, such as guano, and the different chemical manures which are now being introduced, and also seed, because the shifting of seed in a good farm is always attended to, and I have supposed that this weight shall be transported on an average fifteen miles, which I think is a very low estimate. The quantity imported will be one hundred and ninety-seven tons, making altogether of exports and imports, three hundred and forty-five tons.

Then I have taken the expense of transport by railway, at 1*d.* per ton per mile, and in the present advanced state of railways, we may fairly assume that to be the general rate. On this average and taking the number of persons that will travel to market, at 1*d.* per mile, the whole amount of charge for carriage of imports and exports is £40, 8*s.* 9*d.* By the old mode the expense, assuming 6*d.* per ton per mile for goods, would have been £142, 16*s.* 3*d.* These estimates were made, he stated, after deducting for home consumption. The saving thus made on the supposed farm would be £102, 7*s.* 6*d.* and the farm itself, before worth only £400, would be worth £500, or 10*s.* per acre more." It is not improbable that the difference in our own country might be even greater. He also alluded to the great advantage in respect to stock, stating that the expense of carrying on railways is nearly the same as that of driving, and in fat animals the loss in their condition in driving them from sixty to seventy miles was equal to the whole expense of the transport, at least 5 per cent. on the value of the bullock. He dwelt likewise on the benefit to be derived from the more general use of new chemical and imported manures, and the transportation even of earth for the purpose of mixing soils. In reference to the transport of animals, when further questioned, Mr. Smith said, that without rail roads it is impossible to transport fat cattle any greater distance than from sixty to seventy miles without very great deterioration, but rail roads will afford the means of transporting these cattle three or four hundred miles with great advantage, and in carcases they may be transported seven hundred miles. An advantage also mentioned with respect to this last item, is that where the animals are killed in the country and their carcases sent to market from some distance, the offals and inward parts which may be made available in large quantities as manure are thus saved to the land and that which in the large towns is often a nuisance, may become of great value to the agriculture of the country. These suggestions would seem to deserve attention among the agriculturists of our own country, and similar minuteness of investigation would no doubt, throw much light on the subject and perhaps be a better mode of bringing home to the minds of the community the immense advantages of increased facilities of communication than merely general statements, as to the probable amount of transportation, &c. from any particular region of a proposed route.

V. A fifth difficulty in the way of improvement sometimes is the want of the requisite force in animals or laborers. Our error on this subject is, undoubtedly, the *extensive* mode of cultivation which is adopted, instead of the *intensive.* There is a too great fondness for farming on the large scale by which the amount of labor and materials is distributed to far less advantage over a wide extent or area of land, than were they limited to a smaller one. The improvement in machinery and implements will do something to meet this difficulty. Greater improvement in the laboring material will, probably, do still more, as it is well known that efficiency and profit depend on the application of physical force under the direction of mind by which matter as it were becomes inspirited with life and action.

VI. The want of information among the people, their prejudices, and the unwillingness of some to avail themselves of increasing light, form an important item in the list of difficulties which hinder improvement. The new modes of culture are thus kept from having their proper influence, and many a farm which might be made lucrative, is suffered to run down and be any thing but a source of comfort or profit to its owner. The diffusion of agricultural periodicals and works of value, of lectures and all suitable encouragement to the obtaining a higher standard of agricultural knowledge is a method of remedying this difficulty which should be steadfastly kept in view by the statesman and every friend to the welfare of his country.

VII. The tendency of the young men of the country to seek other employments instead of training themselves for this branch of industry. The maxim that labor is honorable, we rejoice to believe is gaining ground, but, perhaps, there is a tendency to forsake the pursuits of agriculture for the more fluctuating and hazardous ones of commercial, mercantile, or manufacturing life. But the aim should be to place agriculture foremost among the physical employments of our country, and to the proper elements for success in this respect should be joined the elevation of thorough acquaintance with its principles as a science as well as its details as a practical business, and thus increased estimation should be shed upon it by the honorable examples which should every where be like lights in all parts of the country. The facilities now afforded by able lecturers in some parts of our land will, no doubt, be multiplied, and schools embracing thorough agricultural education will do much to diffuse still more widely the researches of the scientific and practical men of all countries in relation to this great subject.

VIII. Another difficulty in the way of improvement which is sometimes mentioned, is the mutability of legislation. This we find assigned, especially, in the discussions of the subject in foreign journals. The same cause may operate to some extent in our own country. Yet, as here, there is no direct action on this great branch of national industry, as there is on the continent and in monarchical kingdoms, this influence must be very limited among us, in comparison to what it is abroad. We have judged it proper, however, to mention it in the general summary we are now making.

IX. Ignorance of the science of apportionment. This is, perhaps, one of the most important deficiencies of our agriculturists. There are a few even of the otherwise well informed farmers who are acquainted with this important branch of husbandry. The *economy of the farm* as it may be termed is a subject to which they have devoted little or no attention. Yet there can be no doubt that the bearing of this branch of agricultural science is no slight one. It is for the want of it that there is so much vagueness in the experiments of our agriculturists, and so little ability to present a fair estimate of the real state of their farming. Included in this general topic is that of farming accounts or agricultural book-keeping. This has been made a matter of careful study in Europe, and many volumes have been published on the best methods to be adopted for the purpose. The valuation of the cultivated land which is made according to law with reference to the actual profit or loss, makes this absolutely necessary in those countries. Some of the works which treat of the science of apportionment are full, and furnish a vast fund of information relating to the proportions to be maintained between different crops, the quantity of land, of seed, the number of laborers, the time to be employed, the expense of cultivation, the number of stock to be kept, the quantity of manure to be made, and how this is to be procured, the amount of crops, time consumed, and force to be employed in gathering them, &c., and, indeed, every particular embraced in the operations of farming-husbandry. We have before us now two such volumes of encyclopedias of proportions of admirable preparation, one containing over a thousand, and the other some 400 pages. The former is a digest of the opinions of all the best writers in Germany, including estimates of all descriptions; the latter a proper manual of agricultural proportions ably condensed, and enabling one by turning to it to see at once the exact proportions and relations, and the parts of the most successful husbandry of that country. We know of nothing like either in the English language, and it is believed that were the question to be put to 80 or 100 intelligent farmers of our countrymen, there would scarcely be two who would agree and, perhaps, not one of the whole number who could answer on this important branch of knowledge, from accurate observation of his own experience in the conduct of his farming affairs.

It may not appear to others so important, but we cannot hesitate to allege it as a serious difficulty in the way of improvement, that so much time and labor is no doubt wasted which by a proper knowledge of the relative capabilities of the parts to each other and to the whole might be turned to profit. Things which appear but trifling in this respect may exercise great influence in the general aggregate. It forms no good reason that because these matters were unknown to our fathers, and they have succeeded in the management of their farms, therefore, all such aids should be rejected. This might be alleged with equal correctness against every thing in the shape of improvements of agricultural implements or modes of culture. We might mention other difficulties which lie in the way of improvement, but these will suffice for the present.

In our previous reports, we have here introduced some remarks respecting our surplus products and home or foreign markets accompanied with various tables of articles in transit which more especially belonged to agricultural production. We shall reserve some remarks and a variety of tables for the appendix and hope there to present a fuller view than can elsewhere be obtained in any one volume of our internal commerce and the relations of our agricultural products to the foreign trade and home consumption. It is our intention, if not disappointed in the effort we have made, to give the latest estimate as to the probable demand on our agricultural resources for the supply of other nations and to furnish a comparative list of prices of the various articles which come into market at home or abroad. There are several objects which we would here suggest as worthy the notice of Congress, and of the respective state governments—and which, were a full co-operation granted, might no doubt be attained in connection with our annual report. The interests of the country are so closely allied to the various branches of industry which centre their improvements in this office, that it possesses unusual facilities for collecting the kind of information to which we would now allude.

Almost every one feels the necessity of some yearly compilation of the varied resources of our several states, and could there be procured from every state in the Union the statistics of its progress in industrial pursuits, and especially in agriculture, it would be a great acquisition—particularly if these could be condensed and a suitable summary of the same be made and yearly published. Not only the members of our national legislature, but very many of our fellow-citizens in various parts of the country would find such a condensed view useful, and showing, as it might at a glance the mutual dependence of all parts of this republic, tend to bind together the various sections in firmer union. To the nations abroad it would present such an increasing development of our resources as would lead them to study the means by which our prosperity was attained, and seek it may be, to emulate our example, while our influence would be felt in its happiest form by our standing forth in emergencies of great need, to become as it were the almoners of a kind Providence to famishing realms.

Information and knowledge of our means, is so important that it might well be purchased at almost any cost, and the more diffused among the people is this species of knowledge, the better they understand the nature and productive amounts of the elements of national prosperity at their command—the more enlarged will be their feelings in respect to the high aims which should ever characterize an intelligent, free and virtuous people.

It is ignorance, too limited knowledge of the mutual dependence we have to each other, which tends to generate suspicion and to weaken the bonds of a common welfare, that every year ought to draw closer and stronger into uninterrupted action. The bare fact that there are such peculiarities of climate, such varieties of product, and diversities of business-pursuits embraced within one wide domain and beneath one republican sway, should teach us to search out and gather up and distribute as extensively as possible all the materials which may bring the remotest extremes, and every intervening section, into thorough acquaintance with each other. The public press can indeed do much, but its influence in this respect must be local; there is no one journal, however large its circulation, that is known even by name in every part of our land; and far less can the vast amount of items which are now and then chronicled but to be lost, in the course of the year, produce the impression, even were they more universal than they are, that will be made by a compacted array of facts and figures meeting the public eye at a single view.

Besides the internal trade of the country and the price of the various products of all descriptions, it would be useful to draw together tables of the amounts of state assessments of the different industrial pursuits, the force of labor and its distribution, the multiplied channels where enterprize may take its way, and the outlets abroad by which we may enter into competition with other nations for the trade of the world. It might be well if the representatives of our nation abroad, with observant eye marking every product unknown to our land, that could perhaps become acclimated among us, would transmit to be tried, seeds, roots, and scions, and record, or gather for incorporation in a report, the many valuable particulars relating to foreign industry and discovery which are now as it were hidden from our knowledge. In a short time we should thus understand, no doubt, not only our own resources far more fully, but possess a better acquaintance with those of the nations with which we do or would interchange our commodities, and be enabled to consult our interest and welfare in the relations we hold to them. More, in such an enterprize, depends on arrangement and order than expense, and a comparatively small appropriation of means might accomplish much.

The effect on our agricultural prosperity it is believed would be extensively felt. Some happy discovery of products adapted to portions of our country, might change the whole face of the industrial economy of a state, and results as marvellous as those which have been sprung from the small beginnings of cotton, rice or sugar, or of turnips in England, or of beets in France, might be realized.

There is probably no people on the face of the globe that would sooner be aroused by such incentives to effort, and the success of any truly promising undertaking would not long be undecided.

We have not been able to present so full and condensed a view of our resources, and the domestic and foreign trade of our country, as we hoped to have done. Something, however, has been accomplished in carrying out our design, and it is believed that the information on various topics which we have embodied in Appendix, Nos. 19 and 20, will not be without interest to many of our fellow-citizens. If not characterized by all the precision in many respects which we could wish, yet it is believed that the various tables and deductions possess a more near approach to accuracy than the mere conjectural estimates which are often thrown out in relation to our resources and interchanging traffic. Much time and labor have

population of

been spent in collecting and preparing them, and, brought as they now are, within the compass of some few pages, they will no doubt afford much ground for reflection and gratulation to every friend of his country; while at the same time they will better enable nations abroad to estimate the amplitude of our country and her means of reciprocal commerce.

What then is there to forbid the hopeful augury of our success as an agricultural people. If portions of our country are becoming exhausted of the natural richness of the soil, yet every where within our reach there are a thousand means to supply the deficiency. A truer method of applying the enriching materials, a greater care in the selection of seed, and a more thorough cultivation may enhance its value beyond even its native opulence of the elements of production.

If the mighty host of our agriculturists out-numbering those engaged in any other branch of pursuits are true to themselves, understand their real position, provide themselves with all the requisite knowledge and use it as they may, this great commanding interest will sway public opinion and under the influence of an ennobling patriotism, attended by firm and undeviating attachment to morality and virtue, may cause the wilderness to bud and blossom, and every desert and solitary place in our land to be glad.

Marching on with giant strides in the career of discovery and improvement, combining and distributing on every side the elements of national prosperity, opening pathways of thought for those from whom knowledge has been hid, and leaving behind her for a world to gather from, examples of industry, perseverance and success, fostering every good enterprize and rebuking every ill directed aim, our country may thus become the protectress of the arts and sciences, and her ample resources the granary of nations, that can no longer feed their overburdening population.

should ever

APPENDIX.

No. 1.

Result of observations made during a visit to Germany, in 1844–'45, *by Charles L. Fleischmann, Esq., formerly draughtsman in the Patent Office, and furnished by him at the request of the Commissioner of Patents for the Agricultural Report of* 1847.

I wrote a journal of my whole journey, through England, the north of France, Belgium, Germany, Austria, Hungary, Lombardy, Switzerland and the south of France. The following account of the meeting at Breslau is a part of that journal, and contains various subjects connected with agriculture, and incidents of travel, which may be found of interest:

I.—*Account of the meeting of German Agriculturists at Breslau in Prussian Silesia.*

The Jesuits were remarkable for their superior taste in architecture; all the buildings of their numerous institutions which are scattered over the whole continent are exceedingly imposing and well finished. Breslau is indebted to that order for its fine university, which was formerly a Jesuit institution. In this building the meeting of the German Agriculturists was held, at the lecture room called *aula*, formerly the church of the Jesuits. It is exceedingly spacious, and highly ornamented with fresco paintings, representing the saints surrounding the throne of God. At one end was a platform for the officiating members, at each side of which stood a pyramid, decorated with festoons of ears of grain, fruits and various agricultural implements; the other had wreaths of leaves from the oak and other forest trees, with all the implements used in forest culture and the chase. The other rooms were set apart for the use of the committees, and for the exhibition of different specimens of seeds, implements, &c., and the largest room in the lower story was used for the exhibition of wool in fleeces. Every one of the members had to pay about four dollars, for which he was entitled to take a part in the meetings, all the exhibitions, pleasure excursions, &c., and to have a copy of the Transactions.

On the 8th of September, 1845, about ten o'clock, A. M., the meeting was convened in the aula, and largely attended by as respectable, orderly and distinguished an audience as can be brought together any where, for such a purpose. Several sovereigns sent deputies; all the leading agricultural societies were represented by their ablest men; professors of the most eminent agricultural schools, noblemen, large property holders from Russia, Hungary, Bohemia, Austria, &c., with the farmers of the neighborhood, filled the list to nearly one thousand.

The president, Count Burghaus, opened the meeting with an appropriate address, giving a sketch of Silesian agriculture; and mentioned in it a fact which could not but please those interested in the noble cause of temperance. Prussian Silesia, he said, has heretofore had, to its population of

3,000,000, no less than the enormous number of 2,384 distilleries; and they have usually yielded to the government a yearly revenue of 998,000 thalers; but since the rise of temperance societies, during the first four months of the year 1845, the product of this tax had fallen off to 150,582 thalers; a dimunition, as compared with the same period in 1844, of no less than one-sixth. From this decrease of tax and drink, he of course argued a proportionate decrease of drunkards; of the grain consumed by distilleries, and of the total grain for which a market can be found; and hence he argued that some agricultural labor must be diverted to other pursuits.

The officers were then elected, and six committees appointed to report upon the different sections or divisions of subjects, as agriculture proper; raising live stock; the culture of the forest; technical branches; vine and fruit culture; and wool growing.

On Thursday, the 9th of September, the committee commenced their meetings, and at eleven o'clock, the general meeting took place, when the president of the society of directors of estates made his report upon the last examination of the pupils educated by the directors, &c. I found the examination highly interesting, as it coincided exactly with my views in regard to the importance of practical knowledge in the *economy of farming*. I give here the whole proceeding of that examination, as it will show that the European educated agriculturist does not run wild with some of the new fangled notions, and that he follows the approved and sure road of labor and manure.

Silesian baronial estates can be compared with any in the world; and in sheep breeding, they have not yet found their equal. I hope I shall not be misunderstood. It is not my object to underrate the important services which science has rendered to agriculture; no, but I do not wish to propagate and add to that existing notion of the present day, that the science in general, and especially that of agricultural chemistry, is the principal and only study by which a farmer is to increase his profits. Let him first pay attention to the different parts which constitute the whole, and he will discover many a fault which causes the diminished profit, and which yet no science nor *arcanum* in the world can remedy, except correct practical knowledge. The estates of noblemen, and the rich throughout the continent of Europe, are generally superintended by a person who has the necessary qualifications, namely: a thorough knowledge of agriculture; who is a good accountant, and acquainted with the usual technical branches; as brewing, distilleries, mills, &c. He lives at the estate, and receives for his services, besides a salary, a certain quantity of produce, and sometimes a certain per centage on the nett profit. Most of them have been *educated for their business*, either at schools or under the care of an able director of such baronial estates. As the number of estates is very considerable, there is a constant demand for such superintendents; and it is become a regular profession. It is obvious that the latter mode of education is not always the best, and many an estate holder has obtained from these sources persons unfit to superintend large estates. Repeated complaints therefore, determined the directors to have their pupils examined by a board of examiners before they obtain their certificate as being able to conduct business themselves. In 1842, these directors or inspectors, as they are called, formed a society, which has for its object, to promote and finish the education of those young entrusted to their care; but principally with the above mentioned object of examining them after the time of their studies is finished; and they bound themselves, that none of the members of that society shall take a young man to instruct him except he is willing to undergo an examination before a board of examiners of this society, at the end of his term. The society numbers above one hundred members. In 1845, while I was at Breslau, they held their yearly examination which was the third; the first was held in 1843. The society likewise extended the opportunity of examination even to such as have not been educated by members belonging to that association. It is a rule that no member who has a pupil among those who are to be examined can himself be an examiner.

The examination came off on the 6th of September, 1845. The number of pupils to be examined was sixteen. After their names, birth place, age, schools where they studied, &c., &c., were taken down, it was found that the oldest of the pupils was twenty-three, and the youngest sixteen years of age; the rest between seventeen and nineteen years. Five had finished their education at the Gymnasia; three of them left off at the Secunda; two at the Tertia, and three at the Real School; the rest were educated at some inferior schools.

After the necessary preliminaries, the pupils were required to answer a number of questions in writing; after which they were taken to an estate called Rosenthal (Rosendale) near Breslau. In the yard, the pupils were shown a wagon, which was marked on thirty-six parts; a plough, on thirty-five parts; a hacken (a kind of plough or cultivator,) in five; a harrow on six parts, making eighty-two separate parts. Each pupil had to put down on paper the name of each part, as they were marked, to show whether he was acquinted with all the parts of the implements. After that, they had to show their skill in taking apart and putting together implements, and in case of breakage, to mention the most efficient way of repairing, &c. A sheep was then brought forward, and they were required to set down on paper the answers to the following questions:

1. Is this sheep healthy, and why?
2. How old is this sheep?
3. How is this age called in the shepherd language?

Each one was next required to catch a sheep himself and examine it, whether it had the foot rot, and describe what are the signs of the foot rot. They had also to point out upon a sheep the places where the worst wool grows and on which place the best: To point out the places where the faults of wool are most liable to be inherited.

Several head of cattle were now brought before them and the following questions propounded:

1. How much milk can a cow of this breed give, when fed with grass or other green fodder, how long since she had a calf?
2. How many pounds of fodder does a cow of this breed require per day, during the summer?
3. How much during winter, and the cost?
4. How many calves has this cow had?
5. How old is this cow?
6. What kind of breed, and why do you say so?
7. How much will she weigh?

They were then called upon to estimate the probable amount of meat and fat, by examining the animal in the customary way of butchers. After that they were examined upon horses: the horses were first examined by the pupils, and the following questions required to be answered:

1. What are the peculiar qualities of this horse as a plough horse?

2. Which of these qualities are requisite for a good plough horse, and which are not?

3. How old is this horse?

4. Several places were pointed out to the pupils, and they were asked what kind of disease affects this part and that part?

5. What are the names of the different parts of the hoof, and where are those parts?

The pupils were now conducted to the barns, where they had to show their skill in making straw bands, in cleaning grain, &c., in sowing grain, &c.

After this the pupils were taken to the fields, first to one of a light soil, and afterwards to one of a heavy soil, and the following questions were put to them before a fresh parcel of soil just dug up:

1. What is the name of this kind of soil?

2. What are the names of the principal parts of which this soil is composed?

3. What is the name of the subsoil?

4. Is the subsoil retentive or not?

5. What kind of crop succeeds the best on this kind of soil?

6. How large would you make the beds on such a soil? And why?

7. Is this heavy or light soil, cold or warm?

The same questions were asked as to another kind of soil at a different spot. The pupils returned and gave from their notes the required answers.

The questions which they were obliged to answer in writing, were as follows:

I. In the case of a heavy soil, sown with wheat and oats, and in that of a light soil sown with rye,—state for every month.

1. How much ploughing and harrowing has to be done?

2. With how many horses or oxen?

II. How much manure will you require for it, expressed in loads? Do you call that heavy or light manuring?

III. How will you treat the manure in the stable, in the dung-hill and in the field?

IV. When you have at command Jauche, (drainings of dung-hills,) and mineral manure, how and for what crops would you use them?

V. What kind of weeds appear in the summer and what kind in the winter crops?

VI. And how will you destroy them, when there are such?

VII. How can you prevent these weeds from coming up?

VIII. You have good and bad meadows—to what kind of cattle will you give your best, and which the worst kind of hay?

1. In the naked fallow, suppose that there is planted rape after clover, from which one cut was taken, let there be sown wheat. After peas, let there be planted potatoes—ten acres for each kind of crop:

The required work for each kind of crop to be done in two days?

How much labor of cattle is required in every period?

2. A field of twenty acres is to be manured with eight loads per acre, about the month of June: The field is 1000 paces from the farm yard: All must be done in five days: The manure must be strewed in three days:

How much labor of cattle and hands is required?

3. A meadow of middling quality, of thirty acres, must be mowed in two days; the grass must be immediately spread; when dry, it has to bebrought home in a day, about two miles from the yard. How many span of working

cattle and labor of hands, how many men and how many women are requisite?

4. The crop of a rye field of twenty acres must be brought home in two days. How many laborers

(*a*) To make straw bands?
(*b*) To mow?
(*c*) To gather and bind?
(*d*) To bring together, and for loading?
(*e*) To bring to the barn?
(*f*) How many span of horses or oxen to haul it?

5. The crop of ten acres of wheat, oats and barley, must be threshed in nine days and taken to the market, ten miles distant. How much labor, &c., of men and animals?

6. In a heavy soil there shall be made, in two days, a ditch of three feet depth, three feet wide at the top, one foot at the bottom, three hundred yards long; how much does it cost per yard, and how many hands must be set at work?

7. A meadow of good quality, of twenty acres, about two miles distant from the farm yard, must be mowed in one day—if possible, dried in three days; the hay must be brought in, in half a day and stacked:

How many persons and teams are necessary; and what is the probable crop from such a meadow?

To show their skill in making reports and other statements in writing, the following subjects were given:

1. A superintendent reports to his superior an accident on the estate, and describes the necessary steps he has taken.

2. The superintendent gives a written order and instructions to the overseer of the farm.

3. The superintendent makes a weekly report on the income and expenses of the grain and for seed, fodder consumed by the cattle, on an estate where there are kept sixteen servants, twelve horses and eight oxen.

The next day, the 7th of September, the result of the examination was made publicly known. For this purpose the board of examiners, the pupils and audience assembled at the university, and the following statement was made:

That most of the pupils showed skill in the practical manipulations; but that by some, not only skill, but thoroughness was wanting. They were then admonished on the requirement of these practical manipulations in the farming operations.

The trial, as to the names of the parts of implements, as well as the remedy when broken, &c., was declared not satisfactory; that a better knowledge of the parts of such implements with which the farmer has every day to work, is required and expected.

In the examination of soils and the best kinds of crops for them, the pupils showed considerable knowledge and correct views, but the knowledge in sheep breeding was rather slight; they showed more experience in horned cattle, and the most in their judgment of horses.

In the examination on the culture of crops, they proved well experienced; less so in that of herbage and fodder; had little knowledge in the value of a substitute for fodder, but were entirely deficient in the *economy of farming*, and showed a want of judgment in the quantity of force required for certain labors. The study of this important branch was recommended to their special attention, to acquire a correct knowledge of the amount of labor required for agricultural operations, in order to economize the most important capital, time, which can never be replaced.

The report upon the result of this examination was very independent and honest. It was not like those of institutions of education, where the principal and teachers train the pupils, in a certain set of questions, to astonish the audience on the day of exhibition, when they publicly deceive, as to the high qualifications of the pupils, in order to increase the patronage of their manufactory of learned boys and girls, defraud the parents of their money, the children of their most precious time, and force upon the public a set of ignorant, conceited pretenders, who, instead of adding to the progress of things in general, retard it. This examination would have sufficed in many other places, and the pupils would have been crowned with laurels; but here, the examiner wished not to recommend a young man for a place, when he was convinced the pupil would ruin his employer and injure the reputation of his teacher and the society.

At the close of the president's practical remarks, it was stated that it was the object of the association to ascertain what the young culturist has acquired during his practical studies; that a higher practical knowledge is required to become a director of estates, and that can be the best accomplished by travelling. Further, that it had been hitherto the belief every simpleton could be a good agriculturist, and when every attempt failed to get him along in the world, the farming business was looked upon as the receptacle of all family prodigies of dullness. Of this error, the bad effects were every where visible. It was proposed to the general meeting, to take under consideration the establishment of proper agricultural schools for the less wealthy class.

These practical remarks on agricultural education were followed by a long treatise on the culture of madder, which was ordered to be printed in the report.

The following question, which was brought before the meeting on the 9th, was continued on the 10th.

"How can the injurious effects be prevented, which rail roads produce upon agriculture, by absorbing all the funds (capital)?" It excited great interest. It was agreed that they had the contrary effect; that the construction of rail roads through countries increased the means of the lower class; the shares or scrip (action,) are a new kind of money which increases the general circulation.

On the eleventh, the city of Breslau sent the members a beautiful medal, with the old Rathhaus (city hall) upon it; on the other side, "Breslau to its welcome guests," with the date of the meeting. Several of the wealthy noblemen invited the members to visit their estates.

The third question was next taken under consideration. It was generally agreed that small estates yield a higher revenue and require a larger amount of capital, but that no general rule could be given.

The fourth general question was, "Are institutions necessary in which a young man can acquire all practical agricultural knowledge?"

This question was ably debated by the professors of agriculture. It was thought that the separation of the theory from practice was injurious—both must be combined. Professor Schweitzer of Tharand in Saxony, thought that both can be acquired separately; he recommended that practice should be first learned, and theory afterwards—that the young man should have obtained a good common school education before he undertakes the practical study, and should afterwards finish his scientific education at an agricultural school. Thäer (the son of father Thäer,) demanded also a thorough elementary education, and then the learning of all the practical manipulations. These practical institutions, he thought, should not be too extensive, so that the owner may attend to the whole himself.

The views of Professor Schweitzer were generally entertained.

The fifth general meeting had again education under consideration, and several able papers were read, all to this effect—"*Educate the mass for its pursuits in after life.*"

On the fourteenth of September was the sixth and last meeting.

A Hungarian by the name of Von Toerock, of Pesth, gave an account of the state of agriculture in Hungary, the condition of the noblemen and the peasants, with a mass of information upon that interesting country. He was listened to with great attention. It sounded most singularly to hear, after the sharp precise mode of pronouncing the German of the Prussian, the broad hard dialect of the Hungarian.

The different committees then made their reports of subjects under discussion before the general assembly.

I. In regard to agricultural institutions, the following general principles:

1. The practical instruction must be thorough, and not, as is customary, superficial.

2. In the theory, all high scientific speculations should be omitted, and its application to practice alone be taught.

3. To establish boards of examination over all Germany, with proper examiners for every district.

II. In regard to agriculture.

As the disease of the potato created a general interest over the whole world, a very detailed statement was given, viz:

The cultivation of *potatoes* has been considered important for the production of manure, as it allows us to keep an increased number of cattle, and as a good crop to clean the soil. One-fifth of the whole area of a farm, planted in potatoes, was thought not too much. Some thought two-fifths should be the maximum and one-tenth the minimum.

Sandy soil was here, as every where, considered the best soil for potatoes. The singular theory was advanced, that potatoes not fully ripe, are to be preferred for seed potatoes, which was strongly opposed by those experienced in the culture of potatoes, as they ascribed to the unripe potato the cause of the disease.

The cutting of seed potatoes was declared a bad practice, and if there is a scarcity of the seed, the potatoes should be cut just before planting them.

Harrowing of the young potato plants was considered beneficial to the crop.

Potatoes from seed improves the specimens, and those raised from it are less liable to be diseased.

The potato rot was declared to be a fungus adhering to the seed potato, and when furnished with warmth and moisture, spreads over the whole crop.

Von Martius stated, at the last meeting at Munich, his microscopical investigations, and recommends steeping the seed potato in lime.

Von Schreiber of Vienna, exhibited some early potatoes, (called *Pomme* *de terre de quarante jours,)* which look like large cocoons. I took them for such, so smooth and transparent were their skins. He was so kind as to give me some few tubers, which I have brought with me to the United States.

Of *Clover.*—It was agreed, that when clover is used only for one year, it does not require any other kind of grass seed to be sowed with it, but where used for two years, it is advantageous to sow grass with it, as the grass will come up in those places where the clover is killed by frost or some other cause. Timothy grass was considered the best for that purpose.

To the question, whether grass seed should be sown with the winter crop, or in spring, it was answered, that grass seeds of large grain should be sown in the fall, small grained ones in the spring.

For light soils, the *plantago lanceolata* was preferred to the *avena pubescens.* In Pomerania they use the common *kimmel* and the *poterium sanguisorba** and sainfoin.†

It was observed, that after clover, the crops are less liable to *lie down*—that, after grass, which has occupied the same field for several years, the grain is more abundant and the yield of straw not diminished; that clover succeeds very well, when sown in winter crop, but the crop then must not be too thick.

On the *flax culture.*—Although Silesia has been, for more than a century, renowned for its linen fabrics, it has never excelled, in the raw material; its climate is not as favorable for the plant as that of Belgium, where they can sow much earlier than in Silesia. In Belgium the young plants are not injured by the perpendicular rays of the summer sun, because they have acquired sufficient strength to support its influence. It is of the greatest importance in raising flax, that it should be an even crop, of equal height, equal thickness of the plant, and the field must be made level, the seeds must be brought under ground at an equal depth; that the plants come up at one and the same time; the water-rot and dew rot must be used together, to produce a white fine fibre. It is acknowledged by the ablest spinners, that the machines produce a finer and more even thread, but it is pretended that the application of hot water in machine spinning injures the thread, and the hand spun linen has still the preference. The less durable state of machine linen arises from the thread being more drawn out and the fibres less twisted than by hand.

In regard to the best flax-seed, the opinions were divided; a good many think the Riga seed the best, others the Beinau; but it was generally agreed that seed from a northern climate is preferable to that of a southern, and that seed kept for some time would answer just as well as foreign.

The best land for flax was considered to be of a somewhat sandy nature. The subsoil must be porous, to let the water pass through.

The committee on *cattle* considered only the different native breeds, and all agreed that the common country cattle had some local value, which consisted in being acclimated.

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* Poterium sanguisorba grows upon poor, light, sandy soil, and binds light soil better than any other kind of herbage fodder plant; Fig. 52 represents that plant.

† The sainfoin is well adapted for the calcareous soil. At Schleissheim near Munich, where the soil is scarcely three inches deep in some places, where the subsoil is calcareous gravel of the coarsest kind, and where scarcely any thing grows except heath, this excellent plant succeeded admirably, and yielded a tolerable crop of hay, and a most excellent pasture. I consider it one of the most economical and useful plants to be cultivated for pastures. It succeeded the best upon calcareous soil, and the limestone regions of Virginia would be the country to grow it. It would be an additional nutritious plant to the many which grow in that region. Fig. 51 represents the leaf and flower of sainfoin, *hedysarum onobryshic*—esparsette.

In sheep and wool, I have said that Silesia had no rival; the exhibition of fleeces and sheep were of most superior quality. Of these I shall speak more fully under the head of wool. At present I only mention that I am indebted to Mr. Jeppe, merchant, from Rostock, Mecklenburg, for many beautiful samples of the best Silesian wools, which I collected on purpose to bring with me as a standard for comparison.

The reports of the other committees were more or less local, and consequently less interesting.

The president Count Burghaus, closed the meeting with a very happy speech, and the Hungarian, Von Toerock, made the following appropriate remark: That an union between Germany and Hungary would be a blessing to the latter; that the Hungarians were ever anxious to bring their country into close alliance with Germany, and he hoped Germany would not refuse the hand which a Hungarian offered to a compact of friendship and brotherly love.

This was the finale of the ninth meeting of German agriculturists. Among the exhibited implements, there was nothing remarkable or worth noticing.

Several specimens of vault brick were shown, exceedingly light and porous, which was produced by mixing the bricks with cut straw or charcoal, and, in burning, the substances are charred or consumed by the fire, and leave a light and compact brick. There were also pots made of the shape of sand glasses, about nine inches high, for vaults.

Several of the large landholders in the vicinity of Breslau, invited the members of the meeting to visit their estates; every one received a printed invitation, indicating the place of starting and arrival, with a plan and description of the estate they were going to visit. Count Hochberg, of Fürstenstein, invited seventy to his estate, which lies about six miles from the manufacturing town of Freyburg, in a beautiful mountainous region. Although the estate is fifty miles from Breslau, the rail road conveyed us in about two hours, to the depot at Freyburg, where Count Hochberg received us with that elegance of manner so common among the German nobility. In one of the large rooms at the depot an ample breakfast was prepared, to satisfy our sharpened appetites after a ride through mountain air. After breakfast we visited the flax spinning establishment of Kramsta & Co., which employs 600 hands and consumes 14 cwt. of flax per year. Nineteen of the Count's carriages took his guests to Hochberg. On our arrival he conducted us to the farm yard in order to show us his cattle, consisting of original Oldenburg and cross breeds, of such and Swiss, and the sheep amounting to 9000 head. The latter were in small flocks, about the different fields. Among the herd were several of the Prince Lichnowsky's rams, which were bought that year for one thousand thalers (about seven hundred dollars) per head.

We also examined the extensive stud of horses consisting in a strong breed more for the plough and wagon than the carriage, but of fine proportions and all the requisite qualities for that object. Every thing had the marks of his aiming at the object to be gained—the highest and most lasting profit.

The forenoon had passed by in our survey, and the dinner was announced. This at least was not on the economical plan; it was sumptuous—extravagantly rich. After dinner the whole company went to the so-called

Grund. The way led by the old castle of Fürstenstein, placed among beautiful grounds. From its antique watch-towers, a most charming view of the Riesengebirge can be enjoyed. This romantic place is very much visited by the inmates of the Salzbrunn, a watering place near by. In the vast halls of the old castle, furnished in the most antique style, coffee was served; and the old rusty iron doors of vaults were unlocked, to show the old armor and weapons of the family, among which a camp-bedstead of Frederick the Great attracted great attention. About half past four, the carriages took us to the coal mines near Waldenburg, by the way of Salzbrunn.

Salzbrunn, so celebrated for its medicinal virtues in pulmonary complaints, surprised us by its romantic situation, and the great number of guests, although the season was already far advanced. There were about eighteen hundred visiters this year.

It was night when we arrived at the celebrated coal mines, of which five-sixths belong to the crown, and one-sixth to Count Hochberg. Six large boats took the visiters to the interior of the mine, with a band of music leading the subterranean navigators for three-quarters of a mile into the bowels of the earth. The breaking of the waves against the black wall; the thundering sound of the music, and the flickering of the numerous torch-lights, gave the whole a magic effect. The canal ended at last, and we were at the entrance of the great coal pits. We followed this black passage, till we came to a rotunda supported by columns of stone coal, where we found to our great surprise a table ornamented with garlands of flowers and set out with delicious refreshments. The contrast of the white table cloth glittering with silver and glass, with the red light of the torches gave it an uncommonly wild effect, and would have suited for a scene of Faust, as a banquet in the royal palace of Mephistopheles. The imprisoned carbonic acid gas drove the corks from the silver headed bottles, and their report was re-echoed from the carbon vault. The health of the noble host was drank, a "long live the Count," was responded to from the numerous miners in the various passages, who were at work to show the visiters the mode of working the mine. The coal which amounts to 350,000 tons per year, is transported, upon that subterranean canal, to the opening of the mine, and from thence over all Silesia. The miners enter through a pit from above.

When we had sufficiently viewed all the treasures which nature had here stored up for the use of man, the company returned in boats; and as we were quietly going through the water to the sound of the martial music of the band, terrific explosions, which seemed to have burst the very centre of the globe followed each other in rapid succession. At first they startled every one; but we soon found that it was another treat of our host, meant to show the effect of the report of mortars among these coal galleries. Yet the miners assured some gentlemen that it was always a dangerous experiment, especially when there is a loose vein in the mine. At nine o'clock we left the mines, and greeted the silver light of the moon, hanging in the vault of heaven above us, which seemed more congenial to our souls, than the impenetrable black walls of these coal-treasures. At 10 o'clock the cars left Freyburg; and about midnight we rolled through the streets of Breslau to our various quarters. Every one there present will remember this interesting excursion, and the hospitable and amiable Count Hochberg.

Among the festivities which took place during the agricultural meeting in 1843 at Altenburg, was a wedding celebrated with all the national peculiarities of that part of Germany. About one hundred and fifty young men, sons of farmers, on horseback, all in their national costume opened the procession. They were followed by one hundred and fifty wagons, drawn by horses decorated with ribbands, bells, &c., accompanied by bands of music, with farmers and their wives, and the bride and bridegroom in their peculiar national dress. The procession stopped at the hall where the agricultural meeting was held. There the duke, his family, and the members of the meeting were assembled to receive them. They entered in order, and placed a plough, which they brought with them, upon a platform. Then the bride and bridegroom were presented with a silver goblet, filled with wine, and drank the health of their sovereign and his family. They then formed a circle round the plough; one of the farmers stepped forward, and addressed the young married couple, reminding them of their duties towards the sovereign and the state; not to be led astray by modern notions, but to continue the costumes and mode of life of their forefathers, and to earn their bread honestly, in the pursuit of agriculture; exhorting them to honor the plough, to which they are indebted for their welfare and that of their country. After this the bride and bridegroom ornamented the plough with festoons of flowers, and sang in chorus the old national song "The Plough." What a wise custom, on this most momentous day, to enforce upon the young farmer the important duties of life! The musicians gave a signal for a national dance, and the hall was not deserted until daylight. The members made a present (as is customary) to the bridal party, which consisted of a coffee set in silver.

The general agricultural meeting was closed with a great exhibition of horses, cattle, and most choice flocks of sheep. This was held near Breslau at Grüne Eiche (Green Oak.) Before the distribution of the prizes for the best animals there was a great pageant representing the principal agricultural and industrial pursuits of Silesia. Among them was a wagon displaying specimens of Silesian glass. It is quite as beautiful as that of their neighbors of Bohemia. Vases and other glass ware, cut and colored, were tastefully arranged on the vehicle; the horses themselves being decorated with various shaped glass ornaments, which looked quite novel. Then came the common Silesian agricultural implements, drawn by horses and fine oxen; next a wagon upon which men and women exhibited the preparation of flax, as it is practised in that part of Prussia. After that a Silesian country wedding, and lastly preceded by a band of music, the harvest wreath carried by men and women, all in their national costumes made up the close. Scarcely had this procession passed the staging where the members of the meeting were placed, when a most glorious shower poured down upon a crowd of 10,000 persons. In a few minutes the vast arena was vacant, people seeking refuge in the houses, barns and stables near by.

The city gave a supper in a garden beautifully decorated and illuminated, and a splendid show of fire-works, in which was seen in brilliant letters the salutation "farewell." This was received with great applause and "long live Breslau," was the last scene of this great meeting.

The citizens of Breslau had endeavored to afford every opportunity to make our stay among them as pleasant as possible. The various societies threw open their places of amusement, and musical entertainments were not forgotten. A piece written for the occasion was performed at the theatre. The king gave a great dinner to the members, at his chateau, and the nobility and wealthy afforded the stranger an opportunity of seeing them in their family circles, and of passing the evening in pleasant musical entertainments and interesting conversation. I became acquainted with the upper burgomaster of Breslau and his beautiful and charming lady as well as with other families, with whom I passed many a happy hour which will hereafter afford me recollections as lasting as pleasant of the time I spent in Silesia.

The fleeces exhibited at the meeting at Breslau were sent from the neighborhood of Breslau, and other parts of Prussian Silesia, from Mecklenburg, Hungary, Bohemia, Moravia and Saxony, for the purpose of showing their progress in fineness and thorough character of wool. They were spread out upon tables, in one of the large halls in the basement story of the university. Each fleece had a printed label, with the name and residence of the owner of the flock; the name of the stock from which the animal had sprung, its age, sex, and the weight of the fleece, in order to facilitate the examination and comparison among each other.

The fleeces were the best the above named countries could produce; and it was a rich treat to the connoisseur of wool; but they all differed in degree of fineness and in the character requisite to be pronounced perfect. Only two of the fleeces were considered as bearing all the signs of a perfect electoral wool.

They were unquestionably all fine, but wanting either in "evenness" as the Silesian sheep breeders call it, or in weight of the fleece, in length of the staple, and many of those demands which wool growers make upon a flock of a constant and thorough character.

Those fleeces which were pronounced perfect came from Prussian Silesia. This province has gained the reputation of producing not only the finest wool, and but of being the only market where thorough blood can be obtained. Accordingly it is that to which wool growers come, from near or far at home, to select and buy rams and ewes for the improvement of their flocks. Saxony has lost its former fame, a decline which arises partly from mismanagement and partly from other causes, as the low prices of wool, the division of commons, and the increase of population, whereby land becomes too valuable to be used for pastures. The degree of fineness in wool to which the most renowned wool growers of Silesia have carried it can only be fully appreciated when wool from this period is compared with that of the years when the merinos were first introduced into Silesia; and it shows very forcibly how long it takes to bring it, even when commenced with the best Spanish breed, to that high degree of perfection. Germany has proved to Spain, that it is not the climate on which all depends, not the rich pastures, but enterprize, perseverance, and above all, intelligence, which have despoiled her of the golden fleece.

Nature has done something for this province; its lands lie high and dry; the pasture has been improved by its high cultivation; the climate is neither too cold nor too warm, so that a thick cover is at no period inconvenient to the animal. This portion of Germany is known for its superior degree of intelligence among the large estate holders; to which must be added the chief virtues of this Teutonic race, industry and perseverance.

Kuchelau, Hennersdorf, Gross Sterlitz, Chrzelitz, are the names of the places where the finest stock is raised; and to these places rush the wool growers of other countries, at the beginning of every year, when the surplus stock is sold, to obtain a few of these famous breeds.

The prices for which some of the rams are sold seems enormous; and it will astonish some of our American farmers when they are assured, that a single ram is sold at from fifteen hundred to two thousand dollars, and then the buyer considers it a favor to obtain it at that price. The rich landholders of Russia, Hungary, Austria, &c. &c. seem to pride themselves in having it said, that they have obtained a certain famous ram for an immense sum; and in this, like every thing else, it is sometimes more for the name than for the intrinsic value of the object; and a ram from another place, for from four to six hundred dollars, would perhaps just as well answer their purpose.

The most famous flocks are owned by Prince Lichnowsky. They have for forty years had the reputation of evenness and of possessing all the good qualities of merino; and he has never for a moment relinquished the improvement of his flocks. He has in Prussian Silesia, about eight thousand head, from which he sells, every year, the surplus number, for the sum of forty thousand rix dollars.* It is he who in that country obtains the highest price for his rams and ewes.

Experience has shown that only *thorough* blood should be employed in the improvement of stock. This makes the purchasers very desirous to obtain animals from well known flocks, the character of whose wool is thorough and constant, and answers all the demands of the manufacturers.

Sometimes, in an inferior flock, an animal is found which has all the qualities of a super electoral; but such an animal will produce lambs inferior to himself, and full of the faults of his original parents.

The importance of a good selection of merino sheep to breed from, is well known to every one who is engaged in improving the breed of domestic animals; but in the improvement of fine flocks, it is of a still higher moment; and it is then difficult to find the right kind to select from. It requires a well-practised eye to detect the faults on the parts where these are transmitted and to select just such as are the best ones for flocks, for the climate, and local conditions.

Several attempts have been made, in the United States, to raise fine wool; but they have never fully succeeded. The first attempt was made at the early period when Saxony itself had not yet arrived at any stability or thoroughness of character in its flocks, and when a really fine and faultless animal could scarcely be obtained. These imported from Spain, when compared with the best Saxon breed were of a coarse nature. The requisite knowledge, at that period, could not be expected to be found in the United States, as they had not sufficient experience then in Saxony or any where else. Of late, the imported animals have a higher degree of fineness; but I doubt if the choice is always made from a pure and thorough stock; it is generally a matter of speculation, and the sheep are bought at cheap rates, for which nothing good can be had, from the reasons mentioned above. When money would perhaps be no object, it is always a principle, on the part of the wool growers, to sell abroad the worst kind; and no doubt our wool growers have been made dupes, like all those coming from great distances. Undoubtedly the United States have beautiful regions for merinos; but to effect a profitable result, we must bring from Germany, a *thorough* blooded flock, select for them a dry and sweet pasture, and manage them with proper knowledge. It is out of the question to raise fine wool on the prairies, covered with luxuriant grasses which will answer better for the Leicester breed, or the Hungarian *zachel*. The regions of the Alleghany, towards the south, would be the most eligible location for merinos.

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* A rix dollar is 70 cents.

The committee on wool, appointed by the assembly, furnished me with specimens of wool, from the different fleeces exhibited; and I flatter myself I have a collection which may prove a standard to compare other wool by.

The following *questions* were submitted to the committee on breeding sheep. The committee made a full report of their Transactions to be printed. I was entitled, as a member, to a copy, but the report was not printed before I left Germany: I requested our worthy Consul of Leipsic, Dr. Flügel, who is indefatigable in assisting citizens from the United States in every way, when he can be serviceable to them, to send me my copy to this country. He did so, but the vessel, the "Stephanie," was wrecked, and I was deprived of that valuable document, I shall try to procure another copy and I shall be happy to submit to the Commissioner of Patents, the translation of the most important facts.

Questions on the Breeding of Sheep.—1. What experiments have lately been made with reference to the advantages or disadvantages of successive *in-breeding* of the highly improved flocks of sheep? is the periodical stirring of the blood always necessary, if no hereditary defects require it?

2. Is a prudent *driving* of *lambs* on healthy pastures, that is on those laid down to grass, to be preferred to foddering in stalls? in the summer stall foddering of lambs, especially of *summer lambs*, can we soon pass on to *green foddering*?

3. Can young lambs, without injury to their health, be foddered with *raw potatoes*, or with turnips? at what age? and are potatoes and turnips only proper up to a certain state of preservation?

4. What proportion can properly be established in the feeding of sheep, between hay and potato fodder, or generally between *dry* and *juicy* fodder?

5. Is it for the bodily health of the animal and for the higher value of the wool, proper to shear the *lambs* born in the months of May or June, in the month of October?

6. Has science or empiricism more progress in the healing of the disease? *(traberkrankheit.)*

7. Is the *vertigo* of sheep really homœpathically healed by doses of *belladonna*?

8. *(a)* Has the *Prey's method of washing wool* in its use of cold water succeeded generally, and has it especially been approved in wool with close fat and hardly dissolved?

(b) What is the most suitable method of using this means, and what degree of temperature is required, to make it effectual?

(c) After this method does the wool retain its lustre and a soft feel?

(d) Is there no noticeable diminution of the weight of wool after the same?

(e) Do not the sheep become much weakened by this method?

(f) Is the method easily undergone by the use of the ground root of the *saponaria alba*?

(g) May not the *saponaria alba* be cultivated with success in Germany, and on what kinds of soils?

9. Has not the *arcanum* further recommended by Prey's, which is to be mixed the evening before the shearing with the fodder of the sheep, to produce a mild sweat, and by means of the same an increased weight per cent.,

a higher lustre and a peculiarly agreeable feel of the woo —been approved in its use?

10. What *properties* must a *sheep's wool* possess in order to be acknowledged as the most valuable product?

11. May all the different forms under which the *wool hair* on the bodies of sheep presents itself, according to experiments hitherto, be *classified* in determined categories and gradations and thus be accurately distinguished?

12. Is there some one under these various forms of wool hair which is exclusively the standard for the most valuable character of wool?

13. Has the form of the wool hair always the same influence on the formation of the staple? and is it, for example, always connected with an irregular curl of the wool hair?

14. How may all possible forms of the staple he distinctly named according to their difference and which of them produces the most valuable wool?

15. How is the figure of a *normal* (standard) *sheep* for card wool, and how for comb wool to be represented?

16. What parts of the *body* of sheep require, in reference to the difference of wool to be met with in the standard, a *particular name*?

17. How must the wool be circumstanced or the different critical parts of the body of the sheep, when the animal is valuable for a distinguished breeder?

18. In what way does the *wool after washing* change in comparison with the aspect it presented to the eye before washing?

19. As in the consideration of the foregoing questions, not only all the properties of wool as fineness, softness, &c., but also all the forms of the wool hair, as regular, or highly curled, &c.—and not less all the formations of staple and all the parts of the body of the sheep—are brought into discussion, at the same time an occasion is presented to unite therewith a definite *terminology* as well of the names here used as of others elsewhere. A memoir which may serve in the Transactions for the foundation of the establishment of such a terminology will be prefixed to the article on the breeding of sheep.

II.—*Historical Sketch of Silesian Wool Culture.*

Prussian Silesia, even before the introduction of merinos, always produced a wool of a superior quality and which commanded a higher price than that of neighboring countries; but at that time the number of sheep were not very great, because the baronial estates had the exclusive right of keeping sheep, and pasturing them upon the property of the peasantry. At some of the estates, not one-fourth of the number they have at present were kept. About 100 years ago all Silesia had not one-fourth of the present number, which amounts to two and a half million. A Prussian cwt. of wool (nearly the same as the English) cost about $30, which at that period was a high price when we consider the higher value of silver; the average price of all the qualities of the present period amounts to $52 per cwt. The increased revenue from wool which the Prussian province of Silesia now enjoys can be easily calculated from the above data, but this increase of revenue only effected by the introduction of merino sheep. The first ones were brought there by Count Eckersdorf, who at an early period established a merino stock farm, for which Frederick the Great made him a present of a Spanish ram and a few ewes. In 1801 Count Haugwitz, then minister of state, obtained from William the Third, of Prussia, the best ram and ewes of a small flock, which were imported direct from Spain; these few merinos formed the stock from which Silesia improved its flocks. The merino sheep of both these noblemen were pretty nearly of the same blood—large, vigorous animals, with a strong, elastic wool.

Although the blood was thorough, and the character of the wool good, the number with which they commenced was too limited to produce a rapid progress in the increase and improvement of the flocks. The shepherds entrusted with them were ignorant in regard to a better mode of treatment, and those few precious animals were treated like the native breed, left to themselves and nature. The few samples still existing from these first merinos, show, when compared with wool of the best breed of the present period, how greatly the wool has been since improved, and how much the price of merino wool has been diminished. Since that time, the wool which then cost 165 Prussian thalers per cwt., would not at present bring 90 thalers.

The estate holders of Silesia crossed, with great success, their native flocks by rams of these merino flocks, and the fact that rams with strong, elastic wool, and with a well-developed body, produce a more profitable breed, and in shorter time than those delicate animals, with very thin and soft wool, was fully proved. The wool grower of Silesia became also acquainted with the merinos of Saxony; they procured rams and ewes from these; but they had a different character from the Silesian; the wool was softer, and the sheep of a more delicate form and less in size; Silesia then had two distinct breeds—those of the flocks furnished by the King of Prussia, with a strong, elastic wool, and large, strong body, and the Saxon breed of small size, and with thin and soft wool. At that time the knowledge in wool was exceedingly limited. Very little attention was paid, also, to the form of the sheep; the only object was to obtain pure Spanish blood.

The progressive demand for merino wool, and the success in breeding, induced all the estate holders to improve their native flocks. Saxony was the only country where merinos could be got to supply the numerous applicants, and the flocks of the elector and those of the private estates of Klipphausen and Rocheburg furnished most of the imported animals. Those who had less means bought rams of a cross breed of native sheep and merinos, and in a short time few of the original country sheep could be seen. The improvement was principally carried on with rams of mixed blood, and with a very limited knowledge in breeding. It is a wonder that Silesia has arrived to that superior kind of wool which it now possesses. The different demands of the manufacturers, in regard to the nature of the wool, according to the articles they intended to produce from it, in the beginning misled some of the wool growers, and induced them to make changes, and to increase the fineness of the fleeces, which gave it a tendency to *twist* and *felt;* but it was only in a few flocks, and if such a fault crept into a breed, the original thorough flock always offered a sure remedy. Gradually the Silesian wool growers brought their wool to a quality which answered all the demands of the manufacturers in cloth and various new styles of woollen stuffs, and attracted the buyers from all countries to supply their wants.

The Silesian wool passed through different stages, in consequence of inexperience, till it came to the state of perfection just mentioned.

From 1785 to 1805 was the period when the first Spanish merinos were introduced, and when the wool growers were entirely ignorant in the knowledge of wool and management of merinos.

From 1805 to 1815 was the period when the estate holders of Silesia saw the advantage of raising them, and when the difference of merino and common wool began to be more understood; when in the formation of the staple, a great number of curves of the merino wool hair were considered essential characters for fineness. At that period the wool growers travelled for information, and brought merinos from Saxony into Silesia.

From 1815 to 1825 was the third stage of the Silesian wool culture. The great desire then was extreme fineness; they overlooked many other very valuable qualities of the wool, and the large size and vigor of the animals. The high price of $126 per cwt. caused this error. With the highest degree of fineness, great softness had to be combined; the Saxon breed, which was called *electoral*, combined these qualities. Such sheep were employed in crossing; consequently the finest Silesian consisted of thin fleeced, delicate animals, which, besides a deficiency in wool, were liable to all sorts of diseases.

The period from 1825 to 1830 may be called the test for the German wool growers, and particularly for the Silesian. In that period the price of wool sunk exceedingly low, and it appeared as if England had taken leave forever of the German wool market, and that she supplied herself from her colonies sufficiently for her wants.

Many were affrighted and began to diminish their flocks, and changed their whole system of farming. It produced a crisis, and their attention was principally directed to an increase of wool in the fleece, to compensate for the loss sustained in the prices. This crisis operated very beneficially upon the whole system of breeding merinos: the wool growers, instead of aiming at the highest degree of fineness, had now a greater quantity of wool in view. This was the commencement of a system which developed itself to much more advantage afterwards.

Finally came the fifth stage and the present state of the Silesian wool growing systems, which has for its object to produce not only the finest and softest wool, but in great quantity; and besides a high degree of softness and elasticity and nerve is not overlooked, whereby not only the value of wool, but the weight and volume also are enhanced, and these precious qualities are all combined in the flock of Prince Lichnowsky, and in such flocks as have been reared from this famous breed.

During these various periods the Silesian wool growers have obtained great experience in breeding merinos, and in the nature and character of wool. Societies of wool growers were formed, in the meetings of which the most important questions were discussed, experience and facts made known, and they educated superintendents and shepherds for this branch of husbandry—all which has given them an advantage over other countries, and which it will be difficult to take from them. Spain never will be able to obtain the golden fleece again, and other countries may strive for ever, and perhaps Silesia will be always in the advance. In the meantime the improvements of the farms were not neglected; pastures were sown with grass and clover, and large quantities of fodder were housed for the winter, which amply supplied the flocks with food. Through a proper culture of pasture land they were able not only to furnish a more abundant food, but a more healthy one. They used only the seed of such plants as perfectly agreed with the nature of sheep; the comparatively few cases of disease sufficiently prove this.

Another advantage was gained by this system adopted of improving the pasture land; the wool developed itself more perfectly, and it is an established fact, that the better and more regularly the sheep are fed and taken care of, the more uniform and healthy the wool becomes, and its superior qualities remain without deterioration.

Silesia can no longer increase its number of sheep; its whole farming system has been improved with a view of keeping the greatest number of sheep possible under any circumstances. In regard to quality there is yet a great deal to be done in Silesia, notwithstanding its superiority over other countries in that respect. The above mentioned desirable qualities of wool which some flocks possess, are not to be found in all of them. There is but one-tenth of the whole number which comes under this superior class, the remaining nine-tenths of Silesian flocks are in different stages of improvement, and to eradicate the various faults of wool from these flocks, and bring it to what is called an even character, will be the work of years.

The stables for sheep, with few exceptions, are very spacious and well suited for the object. All the necessary implements and utensils are provided. Order and cleanliness exist every where. Fodder is plenty and stored away with care. Upon the lofts there is great order as to the way, how and when the different kinds of fodder are to be given, and properly measured out. The shepherds, although not yet arrived to that degree of perfection which they should possess are better than any in Europe.

What great attention is here paid to the sheep during the period of coupling! It takes place in January, and summer lambs are considered the most advantageous. The superior qualities of the Silesian wool which is so much praised by the purchasers, are to be ascribed to the change of having the lambs in summer instead of winter. The choice of rams is made with all the acquired experience of the intelligent wool grower himself; and if he thinks himself wanting in the necessary knowledge, he employs others who have the best reputation and make it a regular business. In all the stables the temperature is regulated by means of thermometers; because the Silesian wool grower knows, that a regulated temperature aids in the perfect development of the wool hair. The flocks are yearly thoroughly examined, and those assorted into a class or classes which have the least inheritable faults.

The flocks are either under the immediate superintendency of the proprietors themselves or of directors, who are educated agriculturists, and who have acquired a fondness for this branch, zealous to make such improvements as will bring the flock to perfection. Most of them besides the knowledge of feeding and of the general treatment of merinos, have a thorough knowledge of wool, which can only be gained by long practice and by comparison of the best kinds.

The sheep-master *(schafmeister)* has the management of a certain number of flocks, and under him stands the shepherd, who executes the orders of this employer; and on him depends nearly every thing in regard to the careful treatment in feeding; keeping them in suitable grounds during rainy weather, watching them carefully in respect to health; in short upon him rests the principal success of the flocks. Such sheep-masters are exceedingly rare; and the wool growers of Poland, Russia and Hungary, offer high salaries to induce the Silesian sheep-masters to take charge of their flocks.

Much depends, also upon the shepherds; they are exclusively brought up for that business, and their whole life time is devoted to it. They are familiar with the nature of every sheep in their flocks; and when one goes in the least lame, or forsakes its food, it is caught and examined and treated accordingly. They have sufficient knowledge of the mode of using their pasture lands; they use them in succession, so that the sheep have always a fresh supply of food, and sufficient time is thus given for the grass to grow undisturbed; even the stubble pasture is used systematically.

The written order for the mode of feeding—"how much, what kind, when it must be given," &c., is nailed up in the stables, and the shepherd pays strict attention to it. The quantity of fodder is exactly estimated, and the amount required for the winter season calculated, and an additional supply set aside in case of a late season, and for rainy and cold days. The lambs are numbered by the marks in the ears, or by numbers fastened around their necks. The pedigrees are regularly kept up, so that the relationship of every animal can be given with great accuracy.

Breeding fine merinos is not a kind of hobby among the Silesian farmers, which swallows up all the profits of the estate. No! it is made a profitable branch of the farm husbandry, which pays a good price for the fodder, litter, and labor bestowed upon it, in return for which the farm allows to the sheep account a fair price for the manure. The rotations are not exclusively for raising fodder crops, but produce a great quantity of commercial plants, as for instance rape seed, which was formerly not planted at all in Silesia, but which now amounts to several hundred thousand Prussian sheffels per year; and besides great quantities of grain are produced to supply the growing population with bread stuffs.

The number of sheep upon a given number of acres of land, is on an average, five sheep for four acres of plough land (the Germans call land which is used for raising crops, plough land, in distinction from meadow or pasture land.) This, however, depends on the quality of land suitable for fodder crops and pastures, the number of acres of meadows, and the quality, and especially on the intelligence of the superintendent. Sometimes they keep more sheep, but never less than three for four acres. At the time wool brought such high prices, some of the estates kept only a few head of cattle; but since the prices of wool have diminished, sheep breeding has not been considered nearly so profitable, and partly from the fact that they have ascertained by experience a great number of sheep operates injuriously upon the other branches of the farm, they have increased their stocks of cattle again. But notwithstanding this diminished revenue through the decrease of the price of wool, it is looked upon as the most important and profitable branch of farm husbandry, consequently the proper degree of attention and care is paid to it.

In Silesia the estates are not very extensive; the right of pasturing the sheep upon the property of the peasants has been abolished; the commons have been divided among the different farmers, and every estate holder has to depend upon his own extent of property for the supply of pasture; extensive districts of pasture land, as in Russia or Hungary, have been unknown to the Silesians for many years back.

Breslau has every year two wool markets, one in the spring, the other in the autumn; at the spring market the quantity of wool amounts to about 60,000 cwt., at a value of four million of thalers, (or nearly $3,000,000 of the United States,) in the autumn it scarcely reaches to 8,000 cwt.

Great improvements have likewise been made in washing the wool, also in shearing and packing.

Shearing is generally done by women who obtain usually at one and one-sixth cents per head and for a ram two and one-third cents. Some of them shear thirty to thirty-six per day; but with all the experience these women have, they do not shear well, cut steps, as they are called, and very often wound the sheep.

The wool was formerly packed in long round bags, but now it is packed in square "kollies," as they are called, which are perfect cubes or oblong, and flat like a mattrass. January is the time when the purchases of rams and ewes to breed from, are made, and every one tries to obtain the best. This raises the price of sheep of the most celebrated establishments to an incredible height.

III.—*Mode of Feeding and Breeding Sheep at Alcsúth in Hungary.*

Successful breeding of sheep is in a great measure dependent upon a sufficient supply of food of the first quality, its proper preservation, economical use, and its augmentation on scientific principles. Of comparatively much greater moment, however, is the system followed in feeding them, and it is thought therefore interesting to give an account of the system as adopted at Alcsúth.

JANUARY.—*Breeding bucks*, receive in the morning one pound of esparsette (sainfoin) each; at 9 o'clock, watering; at 10 in the morning half a pound of hay of second quality; at 1 o'clock P. M. ditto; at 3, watering; and in the evening one pound of mixed hay.

Bucks for sale receive in the morning one pound mixed hay; at 9 o'clock watering; at 10 esparsette half pound; at 1 P. M. do.; at 3, watering; in the evening 6 sheaves of oats, half threshed, and twenty-six pounds of hay, to 100 rams.

Sucking ewes receive in the morning one pound of esparsette; at 9 watering; at 10 o'clock, to 100 ewes, one metzen* of potatoes in small pieces; and thereafter straw at one P. M.; each ewe half a metzen of chaff mixed with oats and salt (say three-quarters of a metzen of oats and five ounces of salt to 100 ewes;) at 3 watering; at half past three, to 100 ewes, one metzen of potatoes cut to pieces; and in the evening, to 100 ewes, five sheaves of oats half threshed; and thirty pounds of winter straw for picking. Ewes of weak constitution, as well as those having twins, receive in addition, twice a day, a pint of barley meal each.

Barren ewes and such as are two years old, receive in the morning half a pound of chaff (mingled with three-eighths of a metzen of oats and four ounces of salt to 100 ewes,) at 9 o'clock watering; at 10, to 100 ewes, one metzen of potatoes, thereafter straw; at 12 M., three-quarters of a pound esparsette; at 3 P. M. watering; and in the evening, to 100 ewes, three sheaves of oats half threshed, and fifty pounds of winter straw for picking.

Ewes and wethers two and a half years old, receive in the morning three-quarters of a pound of chaff (mixed with two-eighths of a metzen of oats and four ounces of salt to 100 head,) at 9 o'clock watering; at 10 o'clock to 100 head three-quarters of a metzen of potatoes, and thereafter one-quarter of a pound of barley straw each; at 12 M., three-quarters of a pound of esparsette; at 3 P. M; watering; and in the evening to 100 head, 3 sheaves of oats.

Old wethers receive three-quarters of a pound of carrots; at 9 o'clock watering; at 10 o'clock to 100 head, one and a half metzen of potatoes, and thereafter straw; at 12 M., three-quarters of a pound of hay, second quality; at 3 watering; and in the evening to 100 head four sheaves of oats.

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* A metzen is equal to one and three quarters of a bushel English.

Old wethers and barren ewes receive in the morning three-quarters of a pound of steamed chaff; at 9 o'clock watering; at 10 o'clock, to 100 head, one and a half metzen of potatoes, thereafter straw in the yard; at 1 o'clock three-quarters of a pound of esparsette; at 3 watering; and in the evening again three-quarters of a pound of steamed chaff.

Wethers two years old, receive in the morning half a pound of chaff, with three-eighths metzen of oats and four ounces of salt to 100 head; at 9 watering; at 10 o'clock, to 100 head, one metzen of potatoes, and thereafter straw; at 1 o'clock, three-quarters of a pound of esparsette or hay of second quality; at 3 watering, and in the evening three sheaves of oats to 100 head.

February.—*Rams for coupling*, receive in the morning one pound of oats and vetches mingled; at 10 o'clock half pound of hay second quality; at 1 P. M., half pound of esparsette; at 3 o'clock, watering; and in the evening, six sheaves of oats, half threshed, and twenty pounds of winter straw for picking, to 100 head.

Rams for sale, of the first class, receive in the morning one pound of esparsette; at 9 o'clock watering; at 10 o'clock of hay of second quality half a pound; at 1 P. M., ditto; at 4, watering; and in the evening to 100 head, six sheaves of oats together with twenty pounds of winter straw.

Rams for sale, of the second class, receive in the morning, one pound of oats and vetches mingled together; at 9, watering; at 10 o'clock of esparsette half a pound; at 1 P. M. ditto; at 3 watering, and in the evening, to 100 head, five sheaves of oats half threshed, together with twenty pounds of winter straw.

Sucking ewes of the first class, receive in the morning one pound of esparsette; at 8 o'clock watering; at 9 o'clock, to 100 head, 1 metzen of potatoes cut to pieces, thereafter straw; at 12 M., half pound of chaff with three-eighths metzen of oats and five ounces of salt; at 1 o'clock, watering; at 4 P. M., to 100 head, 1 metzen of potatoes, and in the evening five sheaves of oats, together with thirty pounds of winter straw.

Sucking ewes of second class, are treated on precisely the same footing, there being only this, not very material distinction made with regard to them, viz. that they receive their chaff together with oats and salt, not until 1 (instead of 12) o'clock.

Barren ewes and those two years old. They are fed precisely as in January, with only this difference that they get their esparsette, at 1 o'clock in the afternoon, instead of 12 o'clock.

Old wethers have, in this month, their early watering at 8 o'clock, their potatoes at 9, and their food in the afternoon at 1 o'clock.

Two year old wethers. The hour of watering is fixed at 8 in the morning, that of potato-food at 9, and that of hay-fodder at 12 o'clock; in every other respect the order of February is observed.

Two years and a half old wethers and ewes. The order of food remains as in January, except that in the morning the watering is at 8, and the potato feeding at 9 o'clock in the morning. The straw given after the potatoes during this month is offered in the yard.

March.—*Rams for coupling.* Only the hour of watering is changed from 3 to 4 o'clock, P. M.

Rams for sale. Those of the first class have the watering in the afternoon at 3 o'clock, and those of the second have it in the morning at 8, and in the afternoon at 4 o'clock. In every other respect the order of February is retained.

Sucking ewes of the first class, get in the morning one pound of esparsette, while in every other respect the old order is retained.

Sucking ewes of the second class, get in the morning three-quarters of a pound of hay, second quality; watering at 8; at 9, one metzen of potatoes to 100 head; thereafter straw in the yard; at 10 o'clock, half pound of chaff mixed with three-eighths of a measure of oats, and five ounces of salt to 100 head; at 3 P. M., watering; at 4 o'clock, to 100 head, one measure of potatoes, and in the evening five sheaves of oats.

Barren ewes and such as are two years old, are treated on the same footing as before, except that the watering is to be at 8 o'clock in the morning, and the potato feeding at 9.

Old wethers receive in the morning five-quarters of a pound of after-math, (rowen;) at 9 o'clock, watering; at 10 o'clock, potatoes, one and a half metzen to 100 head, and thereafter, straw in the yard; at 1 P. M. three-quarters of a pound of esparsette; at 4 o'clock, watering; in the evening four sheaves of oats to 100 head, and those that are weak get half a pound of carrots instead of oat-straw.

Wethers two years old are fed precisely as in February.

Ewes two years old receive the esparsette at 1 o'clock, and their hour of watering is 4 o'clock; otherwise the old order remains.

Lambs receive in the morning half a pound of hay, first quality; at 9 o'clock, watering in the stall; at half past 10 o'clock, to 100 head, five metzen of oats; at 10 o'clock, lucerne half pound; at 1 o'clock, P. M. the same; at 3 P. M., watering; at half past 4, again three metzen of oats to 100 head, and in the evening half a pound of oats and vetches mingled.

April.—*Rams for coupling* receive in the morning one pound of esparsette, have drink at 8 o'clock, then straw; again, at 11 o'clock, half a pound of hay, first quality; at 2 o'clock the same; at 4, drink; at 6 o'clock, five sheaves of oats half threshed and twenty pounds summer-straw to pick to 100 head.

Rams for sale, on the whole are treated alike, yet in the evening at half past 5 o'clock six sheaves of oats are given to 100 head.

Old ewes, every morning receive half pound of chaff, with three-eighths metzen of oats and five ounces of salt to 100 head; at 8, drink; at 9 to 100 head, one metzen of potatoes, and after, straw in the yard, at 12 o'clock, three-quarters of a pound of hay, second quality; at 3, drink, then again straw in the yard, and last, at half past 6 o'clock, three sheaves of oats.

Old wethers receive in the morning three-quarters of a metzen of steamed chaff at 8 o'clock; at 9 o'clock, half a metzen of potatoes to 100 head, and then straw in the yard; at 10 o'clock, three-quarters of a pound of esparsette; at half past 4, drink, and after, again straw in the yard; at six in the evening, half a pound of steamed chaff.

Lambs get in the morning half a pound of hay of first quality; at 8, drink in the stall; at 9 o'clock, to 100 head, six half metzen of oats; at 11 o'clock, each, half a pound of lucerne; at 12 o'clock, one pound of the same; at 4, drink at the well; at half-past 4, again six half metzen of oats to 100 head; and at half past 5 o'clock, half a pound of oats and vetches mixed

In the month of May, feeding in the stall is given up, and pasture commenced. At first, and until the sheep have become perfectly used to the rich green food, they receive, before being driven to pasture, dry winter fodder and drink. The sheep are not driven out until the thaw has dried up, and the shepherd's servant has to drive them to that part of the pasture which is especially assigned, so that the artificial meadows may be spared for a longer time, and, on the other hand, the sheep may continually find sufficient pasture to feed on. Moreover, the nearest pastures belong to the ewes, and the remotest are for the wethers; the lambs remain in the vicinity of the farm, and during the hot hours of noon the sheep are to be in the stall, in case the distance does not exceed one mile. On those pastures which are far distant, there are shelters for the protection and convenience of the animals. The flocks are most carefully protected against rain. In rainy or rough weather the sheep must be fed in the stall, where they remain; in addition to the dry-fodder cut to chaff, some green lucerne is given which, as we take occasion to add, is stored up in airy and cool fodder rooms, and is well spread on boards, in order not to get heated.

And *vice versa*, according as the autumn, and therewith the winter feeding approaches, the portion of dry fodder which the sheep receive before being driven out, is increased from day to day, in order that the animal organism may again become disused to rich food.

In November, feeding in the stall is resumed, and,

Rams for coupling receive in the morning one pound of oats and vetches mingled; at 9 o'clock, watering, then straw in the yard; at 11 esparsette, half a pound; at 1 o'clock, half a pound of hay, second quality; at 3, drink; at 4 P. M. six sheaves of oats and twenty-five pounds of winter straw to 100 head, for picking and strewing.

Rams for sale receive in the morning one pound of esparsette; at 9 o'clock, drink; at 10 o'clock half a pound of oats and vetches mixed; at 1 P. M. half a pound of hay, second quality; at 4 P. M. to 100 head, six sheaves of oats.

Buck lambs receive in the morning three-quarters of a pound of oats and vetches mixed; at 9 o'clock, drink; at 11 o'clock, esparsette, half a pound; at 1 P. M. the same; at 3 P. M. drink; at 4 P. M. to 100 head, four sheaves of oats.

Ewes of the first class get in the morning one pound of esparsette; at 9, drink; at 10 A. M. to 100 head, one metzen of potatoes, then straw; at 1 o'clock, three-quarters of a pound of hay, third quality; at 3, drink; in the evening five sheaves of oats.

Ewes of the second class receive in the morning one pound of hay, third quality; at 9 watering; at 10, to 100 head, one metzen of potatoes, then straw in the yard; at 1 o'clock half a pound of chaff, with three-eighths of a metzen of oats, and four ounces of salt to 100 head; at 3 o'clock watering; in the evening, five sheaves of oats.

Ewes for sale receive in the morning one pound of hay, third quality; at 9, watering; at 10, straw in the yard; at 12, chaff, three-fourths of a pound, and with this three-eighths of a metzen of oats and four ounces of salt to 100 head; at 3 o'clock, watering; and in the evening five sheaves of oats.

The two years old ewes and wethers receive in the morning half a pound of chaff, with three-eighths of a metzen of oats and four ounces of salt to 100 head; at 9, drink; at 10 o'clock, half a metzen of potatoes to 100 head, and then straw in the yard; at 1 in the afternoon three-fourths of a pound of esparsette; at 3, watering; and in the evening four sheaves of oats.

Ewe lambs receive in the morning three-fourths of a pound of esparsette; at 9 o'clock, drink; at 10, to 100 head, half a metzen of potatoes, and thereafter oats and vetches mixed; at 10 o'clock, half a pound of hay of the second quality; at 3, drink; at 4 o'clock, three sheaves of oats.

Such *lambs as have been born late in the season* receive in the morning three-fourths of a pound of oats and vetches mixed; at 9, drink; at 10, to 100 head, half a metzen of potatoes; at 11, lucerne, one-fourth of a pound; at 1, P. M., three-fourths of a pound of esparsette; at 3, drink; and at 4 o'clock, three sheaves of oats to 100 head.

Old wethers receive in the morning half a pound of steamed chaff; at 10, drink; from 11 in the morning to 4, P. M., pasture—(if prevented, at 1 o'clock steamed chaff, and at 3, drink;) and in the evening oat-straw.

December.—*Rams for coupling* receive in the morning one pound of oats and vetches mingled; at 9, drink; then straw in the yard; at 11, esparsette, half a pound; at 1, hay, second quality, half a pound; at 3, drink; at 4 o'clock, six sheaves of oats.

Rams for sale receive in the morning one pound of esparsette; at 9, drink; then straw; at 10, oats and vetches mingled, half a pound; at 1, hay, second quality, half a pound; at 3, drink; at 4 o'clock, six sheaves of oats.

Buck lambs receive in the morning three-fourths of a pound of oats and vetches mingled; at 9, drink; at 10, esparsette, three-fourths of a pound; at 1, clover, half a pound; at 3, drink; and at 4 o'clock, four sheaves of oats.

Old ewes of the first class receive in the morning one pound of esparsette; at 9, drink; at 10, per 100 head, one metzen of potatoes; then straw; at 1, P. M., three-fourths of a pound of hay, second quality; at 3, drink; at 4 o'clock, five sheaves of oats.

Old ewes of the second class receive in the morning one pound of hay, second quality; at 9, drink; at 10 o'clock, one metzen of potatoes to 100 head, and after this straw; at 1, P. M., three-fourths of a pound of chaff, with three-eighths of a metzen of oats and four ounces of salt per 100 head; at 3, drink; and in the evening five sheaves of oats.

Ewes two years old receive in the morning half a pound of chaff, with three-eighths of a metzen of oats and four ounces of salt per 100 head; at 9, drink; at 10 o'clock, three-fourths of a measure of potatoes to 100 head, and then straw in the yard; at 1, P. M., three-fourths of a pound of esparsette; at 3, drink; and at 4, P. M., four sheaves of oats.

The lambs and wethers receive in the morning three-fourths of a pound of esparsette or oats and vetches mingled together; at 9, drink; at 10 o'clock, half a pound of potatoes; at 11 o clock, one-fourth of a pound of oats and vetches mixed, or of clover; at 1, P. M., half a pound of hay, second quality, or of esparsette; at 3, drink; at 4 P. M., three sheaves of oats, and the older ones four sheaves, to 100 head.

Old wethers and assorted ewes receive in the morning three-fourths of a pound of steamed chaff; at 9, drink; at 10, to 100 head, one metzen of potatoes, and then straw in the yard; at 1, esparsette, three-fourths of a pound, (or hay, third quality;) at 3, drink; at 4, steamed chaff, three-fourths of a pound.

Ewes of delicate health, and those which have produced twins, receive an additional portion at 11 o'clock in the morning, of half a pound of lucerne and a pint of barley-groats. During the time of coupling, those rams that have been put to great fatigue, receive daily from one half to two pints of oats, added to their food. In the season of pasture the flocks get twice a month salt to lick, two pounds and a half being allowed to 100 head; during the winter, however, only once a month, and then all those sheep which get chaff soaked in salt water for food do not share. Of strewing twenty-five pounds are reckoned for 100 sheep.

Many will doubtless consider this way of feeding as too rich, and as not very economical; yet the principle of abundant food, as observed in *Alcsúth*, cannot be recommended too highly; for experience has shown that between sheep well and those tolerably fed, there is regularly a difference of one-third in regard to the quantity of wool obtained. And then again, it is only by such abundant food that the smallest amount of mortality, as well as the largest increase and that development of their animal organism which gives the sheep, in all periods of its age, the highest capacities of breeding and fattening can be secured,.

It is an undeniable fact that the manor of Alcsúth, in spite of many unfavorable circumstances, has been raised from its neglected condition to its present flourishing state, in a very short time, and by comparatively small expenditures, solely by means of breeding of cattle, and more especially a profitable breed of sheep. For now-a-days it is not the sheep of the finest silky and thin wool that give the highest profit to the farmer; but, on the contrary, it is those whose wool unites with the greatest compactness a proper degree of fineness; because the sheep of this class require smaller outlay as regards feeding, and in fact in every other respect; because they give more lambs, are less liable to sickness, and hence to mortality, and because they are better even for fattening; above all, however, because the finest wool very rarely fetches a price proportionate to its cost, in the market. With these leading views the Alcsúth sheep have been bred. This breed had its origin from the celebrated domestic sheep-folds of U. Altenbourg of Urmény, and was developed into a peculiar and superior race, by the masterly treatment of the breeder. In its exterior, this sheep bears, in a high degree, the character of the *Infantado* race, which, improved and ennobled by proper cross-breeding, as it has been of late, constitutes now the aim of most wool growers.

The Alcsúth sheep is distinguished by its strong-built, vigorous body; its head and neck are thick, its collar having many folds, its body stretched, its back broad and round shaped from the hip bones to the root of the tail; its legs, which are full clothed to the hoof, are rather short than long; its fleece is long, thick, uniformly curled, throughout good, middling fine and uniform. In short, the Alcsúth sheep constitutes one of the finest results of rational breeding of the present time, both as regards the beautiful structure of its body, and its surprising size, which in Hungary was not heretofore obtained; for there are some rams that measure five feet from the muzzle to the root of the tail, and twenty-nine inches from the bottom to the chine.

It is not easy to give the reader an idea or description of the fineness of the wool in words. By the Dolland wool meter, the fineness would be expressed by the quotient of the third class, viz. by 0.0006. Still, to supply those who have no opportunity of seeing the Alcsúth flocks, with a surer standard whereby to judge of the fineness of their wool, a list of prices is subjoined, at which the Alcsúth wool was sold during the years 1838 to 1841, and which was as follows, (by the cwt.)

In 1838,........................	Conv. money, Fl. 145=	$ 72½
" 1839,....................................	158=	79
" 1840 and '41, (when the prices were much depressed,)	128=	64

If it is considered that these prices were paid without any allowance for loss in weighing out the wool, and in fact without any kind of deduction whatsoever, no one can fail to perceive that the quality of the wool must be good and suitable to use. What gives the Alcsúth wool a particular value, and renders it so much sought after, is that its evenness is not confined to single heads, but extends over the whole flocks. This is an object of much importance to every wool grower, since speculators in wool will always prefer to buy the wool of even flocks, to purchasing that of uneven ones, however fine the wool be of some of the interspersed head, for though the wool be less fine as to its quality, the purchaser need not go to the expense of sorting it, as he has to do with a wool of various degrees and shades of quality.

Another thing of great moment is the unusual productiveness of wool, as obtained by the Alcsúth sheep; for thickness and length are so well combined in this wool, that its want of fineness can be of no account whatever. The average weight, as ascertained by personal examination, and by reference to the bills and books, is as follows:

With the ram,................................	3 lbs.
With the wether,................................	$3\frac{1}{2}$ "
With the ewe,................................	$2\frac{1}{2}$ "
With the lamb,................................	$\frac{2}{3}\frac{8}{2}$ "

Accordingly, the entire amount of wool produced in the last three years, by 10,000 head, was 270 cwt. on an average. This is a surprising result obtained from the Alcsúth sheep, with the finest and most perfect washing, although, as is well known, the weight of the wool, even by a middling washing, is lessened at least fifteen per cent. There was a ewe two years old shorn, and its fleece weighed in presence of a committee, and the weight was found to be three pounds eight ounces. As a proof how well the Hungarian wool growers know how to appreciate these valuable qualities of the Alcsúth sheep, it should be mentioned here that there are in Alcsúth every year extensive sales of breeding bucks and ewes, which are principally sold to such persons as are in search of a wool, which to a suitable fineness unites an eminent degree of thickness. Although the stock of the manor is constantly increasing—although it certainly is never deprived of its best heads—still the revenue from the sale of breeding animals amounted, in Vienna currency,

In the year 1837,........................	to 43,713 Fl.*	\$ $8,742\frac{2}{5}$
" " " 1838,........................	" 44,022 "	$8,804\frac{2}{5}$
" " " 1839,........................	" 52,154 "	$10,430\frac{4}{5}$

And this income can be raised considerably as soon as the domestic increase of the stock shall have reached its height.

The normal price of the rams for sale, according to their improved race, is of these three classes, viz. of 20, 40 and 100 fl. conv. money.† Ewes for breeding are sold at 10 and 12 fl. conv. money.

The entire stock of the sheep of the manor, in September, 1840, consisted in all of 10,930 head; viz. 995 rams, 3,303 wethers, and 6,632 ewes. From these proportions it may be inferred, that for the present both the increasing of the stock on hand, and the raising of breeding animals for sale, must be in contemplation at Alcsúth, otherwise the number of ewes would be in great disproportion to that of the wethers

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*A florin in Vienna currency is equal to 20 cts. †A florin, conv. money, is equal to 50 cts.

There were, at the time aforesaid,

In the Acsa district,	1542	wethers.
" " " "	2275	ewes.
In the Marienthal ram stall,	447	rams for sale
On the Hatvan Purzta,	518	rams for coupling.
" " " "	1308	ewes.
In the Gõbõ Gára sheep-fold,	2387	"
In Bányavölgy "	662	"
" " "	1761	wethers.

In the original stock at Hatvan, the strictest attention is paid to the purity of the race, and the attaining of the first aim of breeding is secured by an estimate and classification of the sheep and wool, which is made every year by the manager of the estate himself. According to the issue of this very material preparatory proceeding, it is customary to retain only those which are most perfect, and which, by all their qualities, warrant a continually improving race; while imperfect ones, or such as are of inferior breed, are removed. The genealogical tables, being of equal importance to the rational wool grower and purchaser of sheep, are kept with the strictest and most reliable accuracy. On making the estimate and classification, the suitable rams are allotted to the ewes, respect being had to their mutual capacities; the matching is done by hand, three rams being calculated to one hundred ewes. Neither a ram nor a ewe is used for matching before the completion of two and a half years; in the first coupling they have ordinarily exceeded that age, for the yeaning regularly occurs in December and January, and consequently the coupling does not commence until July and August. The sheep ready for coupling are found among the flock, in the well known manner, by the rams used for the purpose, and are placed together with the rams intended for them, in some separate stall or enclosure. Ewes which after the first, still continue eager for copulation, and thus show that they have not as yet become pregnant, are some eight days after again coupled with the ram.

Three things, therefore, are observed in Alcsúth in the process of coupling, which cannot be recommended too strongly to the attention of sheep growers. In the first place, the matching by the hand, whereby the contemplated improvement of the stock is effected with greater certainty, and which prevents the rams from uselessly weakening themselves by too frequent repetition of the coupling. In the next place three rams are calculated for one hundred ewes, and they are not admitted until they have reached perfect maturity. It is chiefly to these rational principles of breeding that the uncommonly vigorous growth and the little mortality of Alcsúth sheep must be ascribed. Of 3,253 ewes coupled in 1839–'40, 301 remained barren, i. e. 9.25 per cent.; the lambs born in good health were 3,011 (or 92.2 per cent.,) of which 1,446 were rams, 1,565 ewes, and among them 108 twins; a result which is the best evidence of the great vigor and vitality of the animals.

The foundation for this vigor is laid in the flocks of Alcsúth very early, since both pregnant ewes and lambs are treated there throughout, with the utmost care and attention. Fodder continually, good and sufficient, clean litter, a spacious and well lighted stall, adapted to all seasons of the year—in one word, every thing which a predilection for the raising of sheep is able to give, is here united to satisfy and foster both the pregnant ewes and their young ones. All the attendants, down to the lowest servant are informed to the greatest minuteness of the measures to be observed in discontinuing the yeaning. They are as follows:

As soon as the ewe has become attached to the lamb and begun to suckle it, both are taken from the pen and removed to the department called the nursery, where the ewes and lambs continue together, in order that the latter may obtain the mother's milk at any time and almost without interruption. The number of nursery sections is augmented, if required, by the increase of lambs; and there are no other lambs taken in with this mother than such as differ at least three days from one another. In this way the servant is better enabled to watch the tender lambs, and they can more easily find their mother and be near her. After having reached the age of from twelve to fourteen days, the lambs are separated twice every day from the ewes and put in a separate department, called lamb section No. 1, where they are offered alternately fine hay or clover. This periodical separation of the lamb from the ewes, and providing of a proper fodder, has great effect upon the prosperous growth of the lambs. Their organs of digestion become prepared for the food, which subsequently they have to feed upon exclusively; they are likewise preserved from the habit of *eating wool*, and at the same time the ewes are spared, as is highly desirable, since the mother's milk although it is indeed the best nourishment, is the most costly that can be given to the lamb; lastly, the ewes are less weakened and are better enabled to eat their own fodder quietly. The separation of the lambs from the ewes in this section is done: 1st. Early before the taking in of the first fodder, when they do not return to the ewes, until half an hour after the watering; 2d. Again at 10 o'clock, A. M., while the ewes receive their potato fodder and straw; 3d. at 2 o'clock, P. M., when the ewes receive their dinner. Half an hour after watering, the sucking lambs return to the ewes to remain with them until the early fodder of the following morning.

When they have attained the age of four weeks, the sucking lambs pass over to the second lamb section; here the lambs are separated from the ewes for longer spaces of time, or rather they are permitted to be together with them for only short periods, viz: for one hour after the early watering, and for the same length of time from 12 o'clock at noon, after the potato and straw feeding, lastly in the evening, after the ewes have had their supper, where they remain together to the next day. In this section, the lambs receive in the manger, three times a day, well riddled oats, from four to six half metzen being allowed to one hundred head; and besides alternately fine hay and lucerne. It is also customary to put in the manger twice every week a small quantity of salt for the lambs of this section, viz: every time from six to eight ounces per one hundred head. In order, however, to prevent acidity in their stomachs, the salt is given to the lambs immediately before or after sucking. The lambs of delicate health, or backward in growth, also are retained somewhat longer in the first section, or they are brought together in the section for weak ewes, where a better superintendence and a more watchful care is bestowed upon them.

When eight weeks old, the lambs pass into the third lamb section, and henceforward they are admitted to their mother but twice a day, for one hour each time, viz: in the morning after the potato-fodder, and again after the watering in the afternoon before their supper, and this latter (if the weather be good) in the open yard, except for those which are too weak; at night however, they are separated from their mothers. In this section the lambs receive three times a day a larger portion of oats, viz: nine half metzen per one hundred head, afterwards in the morning fine hay, at noon clover, and in the evening oats and vetches, mixed together. It is customary to supply them with a little water after the first fodder and again after the meal at noon, in order to accustom them by degrees to the water.

In the tenth week the lambs are suffered to be with their mothers only once every day, viz: after the early watering in the morning; on the other hand, their quantum of fodder is increased in proportion, and they now receive in the morning at six o'clock, one-fourth of a pound of fine meadow hay; at nine o'clock they are introduced to the ewes for suckling; at ten o'clock the lambs receive one and a half metzen of fresh and coarse barley meal per one hundred head, mixed with one and a half metzen of oats; then one-fourth pound of clover hay per head, and finally some water in the manger. At two o'clock they receive again the same quantity of barley meal and oats as in the forenoon, and afterwards four pounds of hay; at three o'clock they have watering, which, if the weather be fine, is done at the well. Finally, in the evening they receive one-fourth of a pound of oats and vetches mixed together.

At the age of twelve weeks, the lambs, if they are vigorous and developed according to their age, are weaned, while those that are yet too weak, remain with the ewes till the age of from fourteen to fifteen weeks. The weanlings are fed, as follows: in the morning at six o'clock they receive half of a pound of fine hay; at eight watering in the stall; at ten o'clock, one and a half metzen of barley meal, together with one and a half metzen of oats to one hundred head, and afterwards one-fourth of a pound of clover; at two o'clock, P. M., again oats and barley and afterwards one-fourth of a pound of hay; at four o'clock watering at the well, but in addition, the lambs are offered water in the stall also; at six in the evening half of a pound of oats and vetches once a week, towards evening and before the last fodder, the weanlings are furnished with salt to lick, one pound to one hundred head.

The gelding of the ram lamb, as also the shortening of the tail, is done in the eighth week, if the weather permits. In the case of ram lambs the tail is lopped off to six inches, in that of the ewe lambs to three inches from the root of the tail.

The arrangement of the sheep fold is worthy of special attention, which allows the watering, salt-licking, and the straw to be administered in the open air in every weather and season of the year, with the exception only of stormy winter days. In every sheep fold there is a shelter house, without side walls and resting upon wooden pillars, of a proportional length and about nine feet in width. Here the sheep find shelter from the oppressive heat, as well as from snow and rain.

In order that the general superintendence of the sheep, as also the feeding may be attended to with the requisite uniformity, the flocks are divided according to age and gender, in herds of coupling rams, rams for sale, young rams, old pregnant and young ewes, old and young wethers, early and late lambs. From the number of shepherds employed to superintend the sheep, may be inferred how great care must be bestowed upon them. In the original stock of Hatvan there are twelve shepherds to 1,826 head; in the Acsa district seventeen to 3,117 head; in Gōbō Gára, twelve to 2,387 head, &c.; hence there are to one servant in Hatvan 150 head, in Acsa 290, in Gōbō Gára 200, &c.

Owing to this attentive and exemplary management of the flocks, they are constantly in a flourishing state of health, and during the last ten years the mortality, by an average, amounted to no more than six per cent.; which, it must be admitted, is a result scarcely any where else attained in Hungary, where the mortality sometimes averages twenty per cent. especially in flocks that pasture upon the lowlands.

Among the numerous objects of interest to those who come from abroad to see Alcsúth, the arrangements for washing the sheep, and the house for shearing, certainly do not rank as last in importance.

The establishment for the washing of the sheep is built on a very ingenious plan, and the execution of the establishment will be found to correspond throughout to its purpose and design.

IV.—*On the Improved Merino Sheep, with Illustrations.*

Plate II., Fig. 19, is a merino buck, from the flocks of Von Thäer,* at Moegelin. I visited his farm and examined the flock, this buck at once attracted my attention from his fine form, heavy folded skin, &c. I learned from the shepherd, who tended the *ram flock*, that this was the best buck of the whole herd. With the permission of Von Thäer, I made an accurate drawing of this ram, as seen in Fig. 19, in a side view, and in Fig. 20, as seen from behind. I took great pains to put down every fold as they appeared on him. It was in the beginning of the month of August, when the fleece was yet short and the folds could all be seen.

Twenty years ago, bucks with a smooth tight skin, which had extremely fine wool, were considered the best; but their fleeces were light in weight, and had a tendency to run into twist. The German merino wool grower, had to come back to the original form of rams, with a loose skin, many folds and heavy fleeces, and since then they have succeeded in uniting, with a great quantity of wool, a high degree of fineness. This kind of heavy folded animals, rams and ewes, are now considered the best for breeding and wool bearing.

Fig. 21, represents an ewe, the mother of the buck shown in Figs. 19 and 20. Fig. 22, an Infantado buck.

According to Petri, who travelled in Spain, with the view of collecting information upon merino wool culture, the Spanish consider merino sheep, with folds, as a sign of an improved and thorough breed. More or less folds upon an animal give proof of the greater or less quantity of wool; but these folds must be covered with as fine and good a wool as it is on the adjacent parts of the body. There is a great difference in the quantity of wool which a sheep yields, as seen in Figs. 19 and 22, and such as have few or no folds, what the shepherd calls a tight skinned sheep. The Spaniards kill all those lambs which are born with few folds and fine short hair, or almost naked, because experience has taught them that the offspring of such animals bear a fine wool, but produce by degrees, animals with flabby light fleeces which gradually lose the folds, and become thinner and thinner in the fleece and are consequently less advantageous to the wool grower than those sheep which are produced from lambs with plenty of folds and a thick cover of fine soft hair.

When we examine such a sheep, after the fleece has its full growth, the wool must be on all parts of the body even in fineness, the folds must be covered with as fine a wool as on the shoulders and sides; a sheep with such a fleece, may be considered as a sign of high blood. The lambs of the electoral flocks of Saxony, have been of that smooth kind just mentioned, and produced the electoral wool, which was found to be similar to that grown in Spain, from the *merinos estantes*, which is but a small quantity, when compared with the clips from the *transhumantes*, the flocks of which generally bear heavy fleeces.

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*Son of the celebrated Albert Von Thäer.

The common country sheep, on the continent of Europe, have no folds, and they get them only, when they are crossed with full blooded merino bucks, whereby the fleece becomes thicker and closer.

Only to the merino breed belongs the close and thick set fleece, which, in respect to their size, produces the greatest quantity of wool. The folds are not a necessary condition of *fineness*, but of quantity, and are peculiar to the Spanish full blooded merinos. Almost all superior merinos have folds upon the ribs, where the finest wool grows, and the wool of these animals is of such an uniform character that the folds are only discernible after the animal is shorn.

Petri observed, that the lambs which bring into the world fine soft hair and a great number of folds, and whose tails are, in appearance, shortened by the large folds around them, bear the indication of great softness and quantity of wool.

According to Petri, the sheep in the various stages of crossing, can be divided into four epochs, viz:

1st. The original country sheep.
2d. The improved breed.
3d. The improved half blood, and,
4th. The original merino, or perfect blood.

The common country sheep have, naturally, an irregular fleece, consisting of coarse hair and partly of coarse wool, which is not unfrequently of a very unequal thickness, rough in appearance and to the touch. The points of such a wool, stand separate, disunited and unconnected with other hair; the hair is straight and uncurled. Such sheep grow upon a square inch, 5000 to 5500 wool hairs. The lambs bring into the world a long, stiff, waved hair, and few or no folds; sometimes these lambs are covered with hair and wool mixed.

Improved breed, so called, when the buck is from original Spanish blood, and the ewe is a common country sheep. The offspring approach, gradually, by a continued careful crossing, to the merino. In the first, second, third and fourth generation, the skin becomes more vigorous, and developes more power to the formation of the wool staple, which obtains, by a continued skilful breeding, a more regular form and permanent character. The lambs possess more or less folds, especially when the sire had a dense fleece.

In this period the fleece consists of twenty-five per cent* *prima*, 50 per cent. *secunda* and 25 per cent. *tertia* wool. The nature of the wool is still coarse, the wool hairs yet very unequal, sometimes harsh, then again soft, coarser or finer, shorter or longer, and not seldom mixed with *stichel* (bristly) or dogs hair, especially on the belly and thighs, and the wool runs easily into felt. The lambs are covered with a wool, mixed with thick hair, which, on the neck, dewlaps, and thighs, is of a coarse nature.

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* The German wool growers assort the clips of merino wool in—super super; I. super electa; II. super electa; I. electa; II. electa; I. prima; II. prima; secunda; tertia; quarta; quinta; sexta.

In the *third* and *fourth* generation there are about 18,000 wool hairs upon a square inch. The folds then are increasing; those on the dewlaps, bear a coarse *quinta* or *sexta* wool, but those on the other parts of the body a better wool. The whole fleece begins to have a regular wool formation; the curves of each hair becomes uniform, but have not yet arrived to that general uniformity as to form strands of a more uniform nature, the *dogs* and *stichel*, (bristly) hairs, become less, and the wool partakes more of the merino character in proportion as all other qualities are improving.

In the *tenth generation* of improved breeding, the fine wool predominates, a fleece yields 60 to 70 per cent. *prima*, 20 to 25 per cent. *secunda*, and 10 to 15 per cent. *tertia* wool. The fleece continues whitish on the back and extremities, which is yet an indication of coarse wool; but the other parts have already a greyish color, or what the shepherd calls the *noble color*, which indicates the presence of a greater quantity of yolk. At this period, the wool separates upon the back, in regular lines or hair furrows and does not form itself into small wool tufts or staples.

Tufts, composed of hair of various dimensions and curves, last yet for several generations. The animal improved so far, has changed its form and is seen to be improved through a short, round head, with a strong growth of wool upon it, has shorter legs and the ear diminishes also in size. In the face yet appear stichel, (bristly) hair, and it is covered with coarse wool of white color.

The fleece of the lambs consists of hair, coarse hair, and half wool. There sometimes appear smooth woolled lambs, without hair, and sometimes lambs with spots, and sometimes entirely black ones. The lambs born in this epoch have an increase of folds, which are still covered with a wool of coarser nature than the rest, generally a *quarta* wool; on the thighs and feet the dogs and stichel, or bristly hair, become less.

The improved half blood, which is obtained through a continued regular crossing with full blood rams, has already a regular fleece; the flocks of improved half blood have a great similarity in form and size of body; the faulty formation of the wool, also the irregular high curves of the wool hair, becoming less in number. The wool hairs ought, in this epoch, to have the quality of developing themselves in round small tufts, the long wool seams upon the back disappear and are closed up; the wool hair is less exposed to the influence of the sun and rain. The noble qualities of the wool become more concentrated and approach perfection. The yolk which was scarcely perceptible in the beginning of the improvement, takes now the peculiar oily and resinous character of the merinos.

In the twentieth generation, the fleece, by regular crossing and careful management, takes twenty per cent. *electa* III., fifty per cent. *prima*, twenty per cent. *secunda*, and ten per cent. *tertia* wool. There will yet, sometimes be a *stichel*, or bristle, and *dogs hair*, to be found. The head and legs are covered with a fine wool and the ears have lost the original size of the country sheep altogether. In this period, 27,000 wool hairs grow upon a square inch. There appear few spotted lambs, and fewer, with long, coarse, straight hairs upon the thigh and neck. The lambs are born with many folds and a kind of downy hair, among which the wool predominates; in a few days they lose these downy hairs, which are replaced by a dense growth of wool, that distinguishes itself by its fineness and softness.

Petri made the following observations on these downy hairs:

(*a*) They are often five or six times thicker than the wool grown upon the same animal.

(*b*) In sheep with much curled wool, they are more or less curled.

(*c*) There appear lambs with long, coarse hair and wool; where a tuft of these coarse hairs is pulled out from the fleece, the hair yields and the wool remains.

(*d*) This hair, which is very thin, shiny, never changes into wool, but dies, gradually, from the points downwards, in the degree in which the roots of the wool hair enlarge and ultimately dislodge those of this hair.

(*e*) The faster the thin, downy hairs disappear, the finer the fleece becomes. Lambs which are born without that down, yield generally, a fleece with finer wool, which is not much curled, but of no great weight; upon the folds grow a better wool and the sharp hairs lose themselves entirely; but the wool upon these folds in this epoch, is always three or four degrees coarser than the rest.

The *original*, or the perfection of all parts of the animal, have gone through all the grades of improvement. The fleece in this epoch, is separated upon the skin, in small wool divisions, which consist of 2000 or 3000 wool hairs, and which are, from root to top, regularly curved, equal, fine, connected, and at the top, ending in an even staple. The yolk is clear, oily and gives the wool a glossy, shiny appearance. These wool divisions are about as large as one-sixteenth of a square inch.

The fleece of an *original*, contains upon a square inch, 40 to 48,000 wool hairs.

Mr. Jeppe remarks, in his report on wool, at the meeting of German agriculturists, at Munich, Bavaria, held in the year 1844, p. 610, that upon a heavy fleeced animal he counted, on one-sixteenth of a square inch, 2618, and upon a thin, flabby fleeced animal, 1018 wool hairs; the wool was nearly equally fine in both fleeces.

V.—*On the formation and growth of Wool, with Eighteen Illustrations. Plate I.*

On the formation and growth of wool, especially of merino wool, as well as respecting the considerations which are to be regarded in the breeding of Sheep.—The wool of sheep does not grow, as does the hair of other beasts, in a manner that every individual hair takes its own direction, but its many threads of wool unite always into one little tuft, and each of these again, stands in such connection with the rest as may allow every wool pelt* (every fleece,) as a whole to appear like a web. The single tufts we call the *staple*. Fig. 1. Plate I.

The *formation of the staple* may easily be discerned in the surface of the fleece, which contains on it web formed furrows, woolly seams, but will be more noticeable if one lays the same out together, in any particular place. If we examine the staple more closely, we may discern in it the so called *strands*, (still smaller bunches) in which many threads of wool are closely connected. Strands of different forms, different fineness, or of an irregular curl, transfer these peculiarities to the staple, whereby yet further the exterior of the whole fleece is affected. We may, with tolerable certainty, from this form, and from the state of the staple draw a conclusion as to the condition of the threads of wool, and correctly assume that the wool which has a good structure of staple, must also possess the other good properties which render it a valuable article. But the inverse of this does not hold, because the condition of the sheep, dust and smut, moist and musty fodder, frequently the soaked state of the fleece, &c., may give to the staple a faulty appearance, without affecting the goodness of the wool, or being injurious for the whole life time of the animal.

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* Strictly speaking, there is a distinction between *pelt* and *fleece*. Wool is called *pelt* so long as it is still on the body of the animal, and *fleece* when shorn, but still remaining in its natural state.

The wool itself appears, otherwise, in the staple, much shorter than it really is in its extended state, because by its curl it is very much contracted. This is so much the more the case, as the smaller and more regular are the bends of the single threads of wool, the more it allows itself to be stretched out far beyond the length of the staple, indeed, to double the unstretched length of the same. Such we call wool with *short contracted staple*, and such as scarcely allows itself to be stretched to half its length, or yet less, wool of a *long extended staple.*

The staple itself must approach a cylindrical shape where it is well formed, and be round and smoothly terminated (blunt) on the upper end, (See Figs. 2 and 16,) and not flat as represented in Fig. 17.* A too large and broad staple, which gives the upper surface of the fleece a thick closeness, leads to the probable inference that the wool is harsh, yet the staple often appears of greater circumference, that is, more extensive, than it really is, while a stronger and larger staple in extent is frequently composed of a greater number of small ones.

If the staple comes out strikingly pointed, so that it ends with a hairy point, this shows that many hairs do not reach to the top, either because they are shorter, or because they have an irregular growth, and, on this account, the single strands do not lie continually near to each other. See Fig. 3. Such uneven grown wool is called *untrue*, not clear, and causes many difficulties in the manufacture, hence we consider this peculiarity as among the principal defects of wool. A *clear*, true wool, which is valued above all, on the contrary, is that in which the strands of the staples lie parallel to each other, because the single threads are of equal fineness, and their curves of equal size and form.

If the points of the staple stand out very far, we say that the wool is *pointed.* If, besides, they are underneath pretty strong, and many stick out far, then the surface of the fleece has a stiff appearance like a reed, which is likewise a fault. See Fig. 4.

If, on the contrary, the staple is thicker and stronger above than below, then, too, the single fibres are coarser above than below, and thus it is not fitted for an even yarn. See Fig. 5.† Sheep with such staples appear, on the first view very rich in wool, but, on closer examination, by no means show themselves to be such. We must not confound with these, staples otherwise well formed, which (as frequently happens) have become stronger, rougher and harsher on the upper surface, on account of dust, smut, rain, &c. This is not to be regarded as an intrinsic fault, but only as an outward disadvantageous disfiguration, the causes of which may be avoided, and, so far as possible, ought always to be so.

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*Fig. 18 represents a staple of true well stapled wool, in a washed state.

†If we assume that the rougher points of the wool hairs, in manufactures, lay themselves on the upper surface of the fabric, thus is lost, an equal lustre (reflection of the light) on which especially depends the beautiful appearance of the same.

The *curling* of the upper end of the staple, *by which* small knobs arise, is also a defect, because then the particular woolly fibres are not of equal length and fineness. Fig. 6.

The staple must, further, stand upright. The opposite to this case indicates flabbiness. It is only when very fine wool is at the same time somewhat long and soft that the staple can maintain any erectness, but even then it must not be wholly flabby, for this would be, at the same time, a proof of the poorness of wool and its want of compactness, which, indeed, are not rarely to be found in sheep of such wool.*

When the wool is curled more on one place than on another, and many staples also stand upright, while some are blunt, and others again pointed, this is then a mark of the greatest unevenness of the wool, and the surface of the fleece maintains a *bushy* appearance; but, if it is found only somewhat uneven, (as it were wavy,) in otherwise even growth and tolerable compactness of the fleece, and also, without showing defective points, this is not to be considered a fault. It sometimes happens, with sheep of very fine, but somewhat long and soft wool, when the same are poorly fed.

It is defective, when the wool on the back of the sheep parts and hangs down loose on the sides. It then not only wants the necessary connection, and also many other good qualities, but it is also often washed out by rain on the back, and thus becomes rough, harsh and coarse pointed. Generally, a fleece should not open itself, but present itself more closed; the former is always a sign of a thin state of the wool. If the staples are, also, at the same time, loose and drooping, such fleeces are called flabby or *shaky*. They have especially the defect, that outward influences operate more disadvantageously on them than on the closed kinds.† Much as a closed fleece is desired, the surface of the same must not appear like a board, because then usually the staple is too large and flat, and the high degree of fineness is lost to the woolly fibres. The fleece must more resemble a soft, elastic, even cushion. If the surface is not wholly smooth, but is covered with little soft knobs, (hard ones they must not be,) as if with pearls, then this shows a great softness of the points which is approved. It is called *bedewed,* and also *cauliflower staple.* Fig. 7. If the wool appears, on parting it on the body of the animal, as a uniformly woven cloth, while many staples are apparently joined into one whole as it is said, the *wool* is *full*, and is not therefore of less value, because it is regarded as a mark of the truth, purity, and similarity of the particular fibres, *(evenness.)* So, too, it is approved, when the staple, on closer examination, shows continual indentations across its whole breadth, for such are always the signs of evenness, purity, and compactness of the fleece. It is called *meshed*, because the wool has a resemblance to striped stuff.‡ Fig. 8. But the *full* wool is to be preferred to the meshed. When the single hairs, as well as also the strands and staple, hang closely together inwardly, it is called *craped*, or is said to have the *crape*, because it then, seen sideways, possesses a remote resemblance to crape.§ This peculiarity is very much valued by some wool breeders, although others are of opinion that rams (bucks) with such wool, are not suitable for improved breeding, because thus, in the lambs, *flabbiness* and other faults are easily produced.

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* This refers especially to merinos, for, with the peculiar long woolled races of sheep (to which partly the English sheep, the sheep which are found in the north German flats, the so called *Zackel* sheep and others belong) usually the wool hangs more than it stands up.

† The refuse of fodder seizes much easier on a flabby coat of wool than on a closed one, Hence arise the *fodder tags* which are so great a plague to manufacturers.

‡ Or yet more to knit stockings.

§ As to what is peculiarly understood by *craped* wool, the views are yet divided. Without doubt the next meeting of the German agriculturists will furnish light on the subject.

Wool is called *strongly marked*, when the curves of the single fibres are very high and perceptible, but are uniform. Fig. 9. But, if the curves are uneven, sometimes small and sometimes large, (Fig. 10,) and many of the small ones run together again into the greater, and twist the strands together in particular places, so that they appear winding at these points like a cork-screw, (Fig. 11,) then the wool is called *twisted*. This is a worse fault, because twisted wool cannot be well spun in the spinning machines, and does not produce smooth cloth. We must therefore labor, to the utmost, to counteract this fault, which usually affects the withers of the sheep, between the shoulder blades. Often the strands are not twisted together in *cork-screw* form, but in *small knobs;* this, indeed, is not so bad, but it is not desirable. When the strands of the entire fleece become very perceptible, and hardly seem to have any connexion, then it is said, *the wool is furrowed*. In a slight degree this is no fault, but it becomes so as soon as there is a want of connection of the separate strands, and then the fibres can be easily separated from each other. The wool, then, where such is the case, is *stranded*, which is not very different from being twisted.*

If the particular fibres, strands and staples, stand apart from each other, without showing too much dependence on each other, then it is distinguished by the term *empty-hollow* staple. See Fig. 12.

If the whole of the wool is empty or hollow, such a conditioned fleece is called a *hollow fleece*. Sheep which are thus affected in general have only a little wool. The faults also of being stranded or twisted are often connected with it.

When the not clear wool (already explained above) is found in so great a degree, that the strands in many places lie closer together than in others, and the curves of the particular fibres are very different in form and size, the wool is called *tangled* and in a yet higher degree *felted*. This fault may sometimes arise out of a disease, a sickly, weak state of the sheep; and besides, is probably an original tendency. In an unblemished fleece, not a trace of felt is to be met. The fibres of wool belonging to a staple, must have been so perfectly closed together, that the particular staple from the surface of the fleece to the foundation may be fully separated from each other, without the particular fibres running up, across or in streaks from one staple to another, as it were binding it and probably passing through many. Such fibres, which usually are smooth and extended, and so appear longer than others, are called *bind* or *false hairs*, and then, when they pass in through many staples and lie in upon the surface are called *overrunners*.† Figure 13. These last are sometimes to be found in old bucks, though they were formerly celebrated animals, when they have been strongly used for breeding. But if now the staple of a fleece allows itself to be separated even to the foundation, then must the connexion below on the skin be stronger than on the surface, and not have its foundation in cross-running bind hairs, but only in similarity and evenness of the woolly fibres, which cause an inward inclining together of the same. This desirable connexion in the shorn fleece is called *doughy*, and adds great value to it. But the *soiled-soaked*, *soily*, must not be confounded with the same. This is one of the greatest faults of wool, by which it is rendered useless for any valuable fabric. It consists in a perfect felting of the lower part of the fleece, while, at the bottom of the same, many defective fibres of wool run across through the staple and strands, and so complicate and *felt* it that the wool only can be drawn apart with great trouble. Figure 14.

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* The fleece consisting of stranded wool, after washing, falls apart, it unlooses in strands, in the peculiar sense of the word. The fleece with twisted wool, indeed, shows a connection, but it is (instead of being at the lower or skin end of the fibre) on the top end, so that when any one draws it out apart, it appears like a net work. Merino sheep which have the fault of twist, our shepherds call *Roussilloney*, because the sheep which came to us from the province of Roussillon had such wool.

† When one runs his fingers, as if with a comb, through a wool coat which is affected with bind hairs, the last remain between the fingers. Besides they are likewise seen by the eye; when one lays open a wool coat to the light, the bind hairs then offer some resistance.

Probably this fault in a great measure arises as a consequence of an earlier sickly state of the sheep, and to some extent connected therewith (probably an original cause of it) is the stratified appearance of the wool, which is especially found in the best blooded sheep, when they are suddenly transferred from a good, rich nutriment to a scant meagre one, or are strongly affected by hard birth, strained sucking, and other similar circumstances, or are weakened by any disease. If, for some time, there is a stagnation in the growth of the wool, it remains *stationary*. If it then grows again afterwards irregularly, the new growth does not attach itself to the old; and we notice, after some time, running across through the staple, a *streak*, like an offset, where the fibres of wool are weaker, scantier, (*hunger fine*) and also have lost in tenacity as well as in elasticity. Figure 15. This causes the more injury, because, in the preparation of the wool, it tears in those places.

But besides the peculiar wool, all sheep have, in particular places of their bodies, real hairs, some more, some less. Of these are reckoned:

1. The so-called *dog hairs*, which are especially found on the hind shanks, and also on the heads of certain animals, yet seldom in considerable quantity. These hairs are coarse, long, smooth, without curves, shiny, harsh, and almost without elasticity.

2. *Stichel hair*, short, stiff, shiny, strong below, above very pointed, which are found singly in every fleece; but only hang, loose therein, fall out in shearing, or in sorting, and therefore do not depreciate the value.*

3. The hairs with which many lambs are covered at their birth, sometimes thickly, sometimes only singly, in addition to the small locks, in which the wool staple is to be recognized. They are soft, short, and pointed and generally fall out, leaving a place for the wool. It has been remarked that lambs, which come into the world with such hairs, are peculiarly rich in wool. The better sort of wool shows, after a full year's growth, at the time of the usual shearing of wool, either short, compressed staples (1—1½ or at the highest, 2 inches long) which are small, blunt, and perfectly cylindrical, but well rounded above, which form a close, nearly even, or cauliform surface of the fleeces; or if it is long stapled, slightly curved, it is of a more sleek character. The staples, in this case are 3 inches, or above, long, and do not end roundly, but more in a pointed form, and yet without having any faulty points. The short stapled as it is called, is the

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* This does not much depreciate the value of the wool, but much injures the worth of the animal, from which it comes, as a breeding animal, especially, when the stichel hairs are very hard and dry. It is regarded as a mark of a less noble animal; while the tendency to hardness is apt to prevail, in the reproduction of wool; mildness and softness is that peculiarity at which the sheep breeder has to aim, more than at any other.

card wool, as the long staple is the *comb wool;* the *first* is used for making cloths; the *second* for smooth fabrics. If both sorts of wool unite the like fineness, smoothness and softness, without any faults in growth and formation of staples, then have both an equal value.

In order to learn how to *prove* the *fineness* of the fibres of wool, by the eye, the eye must be practised by the comparison of many sorts of wool. If they are laid on a black underground, near each other, and the single fibres are often compared with each other, a considerable skill is acquired after a little observation. The surest standard is after all, a well experienced eye.* For the farmer who makes use of a sound, dry, rather lean than fat pasture, and has a healthy, strong, though not succulent winter fodder, and therefore, for those also who have to manage chiefly a sand or sandy loam soil, perhaps with a wholly dry-situated, warm, mild loam, or marshy soil, in most cases, sheep with a high degree of fineness of wool will be the most profitable; especially if a stock of such is already in his possession, and needs only to be improved. In such circumstances the chief endeavor must always be directed to attaining the highest fineness, in order by the high price of the wool, to make up any defect in quantity.† In other circumstances, on the contrary, when nutritious, fat pastures, a grass growing, fruitful soil and luxuriantly produced winter fodder, favor particularly the full nourishment of the sheep, a fine delicate breed is not suitable; because such circumstances are unfavorable to the health of such sheep. At the same time, although the production of wool of great fineness, which may be effected in the easiest manner by *suitable* but good nourishment is rendered difficult by rich fodder, the weight of the shearing, on the contrary, is of course increased. It is, therefore, under such conditions and other similar circumstances, mostly found profitable to aim rather at *quantity* than at the higher fineness, in order that one may be repaid, by the increased quantity, for the lower price. Circumstances may, therefore, occur which render it advisable to keep merely country sheep, and only to have reference to the production of a good comb-wool; first by crossing with *long stapled, rich wool, strong and large merino bucks*, or with rams of the Dishley or Leicestershire breeds;‡ then further by means of an ennobling of the third generation, by breeding in with a great attention to the selection of your breeders. Especially, when we can sell off heavy, fat sheep, profitable to the butcher, and the *masty* pasture favors their becoming fat, it may then be expected that in keeping such ennobled country sheep, more profit may be derived, than by a fine sheep fold. Whoever makes the production of a highly fine wool the object of his sheep breeding, will finally obtain a flock, each of which bears scarcely more than one pound of wool; but on the contrary whoever merely directs himself to secure a rich weight of wool, will by richer nutriment obtain sheep which will produce four pounds and over of wool. In an economical respect, it is, in most cases, advisable, to avoid both extremes. But above all, in order to obtain a sufficiently profitable sheep fold, whether it be by the production of a highly fine wool, or by the quantity of wool, one must be careful, and one must indeed know what he would have, and not waver and change the wool, in his aims and experiments; he must know, what he would have, and that by proper means. A highly fine ewe must not be paired with a coarse-woolled buck. The transition from one variety to another, when it becomes necessary, must be made only gradually. If there is a fine breeding ewe, of too thin wool, flabby, and hence a thickening of the fleece is desired for the next offspring, then must she not be paired with a ram (buck) which is remarkable for great quantity of wool, and is dissimilar in the coarseness of his wool and other qualities; but we must first look out a buck for her which has a fleece thicker, fuller of wool, and which also, in regard to fineness and structure of the wool, agrees tolerably with hers. In opposite cases, we manage according to the same principles; consequently every one should carefully avoid rapid transition at every coupling.

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* Fineness is closely related to the size of the curves; and it might be said, that *the smaller the curves the finer the wool;* therefore also the sheep breeder, where no great exactness is required, generally judges of the fineness according to the formation of the curves. There may be cases, also, where we must proceed with all possible accuracy; as for example, in the discrimination of the peculiarities of a breeding buck, as kinds of wool are found which are almost wholly without any curves, or where the bends are very flat, and where also this standard cannot be employed: then the sheep breeder must accustom himself always to determine, directly by the diameter of the wool hair, (the fineness.)

† To form a flock of sheep to that degree of fineness, which is the utmost that might be attained, might, indeed, be advantageous under no sort of circumstances. In a sheep fold which produced wool of great fineness, there is always a part of the offspring which, while it overruns the degree of fineness, that it is your object to produce in the shearing weight, no longer maintains the point which must be reached, in order to make your sheep fold profitable. This defect must be remedied, however, if the sheep breeder avoids working against it, while in pairing he assigns that part of the offspring to a buck of rich wool. But generally many favorable circumstances must co-operate, if one would obtain a remuneration from the production of wool of the greatest degree of fineness; among which *the opportunity for a profitable sale of superfluous bucks for breeding*, stands foremost.

‡ A distinguished stock of this kind is to be found at the royal private domain Seagurt, at Ludwigsburg.

It is likewise to be noticed, at the same time, that the powerful, thick, and rich-woolled bucks more strongly transmit their peculiarities than the thin and fine-woolled; so that it is easier to increase the weight of wool, of a highly refined flock, than to bring it to a yet greater degree of fineness. For these reasons must the last peculiarity, in a flock of this kind, be highly regarded; and if any one feels himself inclined to aim at greater richness of wool, it is particularly necessary to proceed with great care, in the selection of bucks. But we must also, especially in a very large estate, or in the joint sheep folds of proprietors, aim at the production of a wool of an uniform character and the growth and formation of a staple free from faults; since, in most of our sheep folds, we now find at the same time, long and short, coarse and fine wool, thick, slight curled and uncurled fleeces. In order to attain gradually to an entirely uniform kind of wool in a sheep fold, according to the opinion of judicious sheep breeders, we should make use of bucks of an uniform character, that is of equally long or equally short wool, &c., according as any one guiding himself by local circumstances wishes to produce a longer or shorter wool; and not, as happens at the present day, choose bucks of different kind of fleeces for coupling in one and the same flock of ewes. We should also manage the refining of the wool or the production of greater richness, according to the rules and principles already noticed. The bucks must be chosen from the sheep folds of exactly the same kind of growth and formation of staple, and the wool must, at the same time, be of equal fineness in the hair in all parts of the body; that is, *exactly even;* for only with such can we reckon on continuing the blood and securing a good stock in future. The choice of the buck must be made in the months of March and April, or at least before the shearing by one who is a judge in such matters, with circumspection and prudence; but not as is frequently done shortly before the time of crossing—by the shepherd who then, even if he understands it, can make no proper choice

The neglect which has been practised hitherto in this matter has caused great loss and injury to the breeding of sheep—just as the unsuitable choice and small care of the bulls has done in the ennobling of black cattle; and generally as the use of poor breeding animals in the usual raising of domestic animals has also done among them. It is greatly to be desired that the agriculturists, through whose carelessness it has increased, should seek to avoid it for the future.

A sheep fold which produces a wool even and free from faults, the animals of which are well kept during the entire year, whose fleeces have been brought to market well washed, will always command a higher price; that is to say, it will repay the labor and trouble spent upon it, and yield a higher interest on the capital invested than will one where these conditions have not been fulfilled. In order to be able to afford to the sheep a suitable care during the time of pasture, by summer foddering, in the months of June and July, &c., we must make use of all our capacity for the artificial culture of fodder; and remember that while in the time of pasture, one sheep will not find sufficient fodder on a Weimar acre of naked fallow pasture, yet on the same extent of pasture sown with yellow or Spanish clover, eight or twelve sheep may be kept; and with green mowed clover, on the same area, accordingly as the soil is more or less favorable to the culture of clover, 20 sheep may be foddered, for five in the stalls; but at the same time, through the increased production of dung, we can also produce more grain and other vegetables and fruits, than if, as is now usual, large areas lie idle for pasture; and besides, the herd of cattle in general is not lessened, but rather increased. Not more than thirty years will pass without generally furnishing room for conviction, that it is better for the health of the animal, for the wool, and generally for the whole farming interest, if the sheep be foddered, for the greater part of the time of pasture, in the stalls, or in the open spaces of the yard, surrounded with herds, under the open sky, and only sometimes be led out to range on the natural pastures devoted to this purpose.

VI.—*Marking Sheep*

The German merino wool grower have various modes of marking the sheep. The signs or marks are either put on by means of color, burnt in, tattooed, cut in, or marks hung round the neck.

Sheep which are destined for the butcher, are marked with paint on the back or side.

The rams are marked upon the horns with hot irons, upon which the numbers or signs are engraved.

A very common method is tattooing. It is done on the inside of the ear by means of signs or figures formed of steel points, and forced into the skin in the following manner: First, a kind of thick paint is made of vermillion, indigo, or gunpowder and whiskey; when the paint is prepared, the sheep to be marked is bound and placed upon a table and held by one person, while another puts the paint upon the inside of the ear, and presses the signs or numbers into the skin, without causing it to bleed; when the instrument has been withdrawn, the paint is rubbed into the marks. In about three weeks the marks become hardened and are indelible.

All sheep of the Count Caroly's flocks are marked in that way, corresponding with the register and pedigrees. The signs and numbers were very distinct even in old sheep, which had been marked for several years.

The instrument used there is constructed as follows: Upon the lower jaw of a pair of nippers, as seen in Fig. 27, there are grooves *a*, *b*, *c*, *d*, into which the numbers or marks are; these marks or numbers are formed of steel points, as seen in Figs. 28 and 29. Fig. 31 shows two ears, in one of which is tattooed 3465; in the other the number seven, indicating the year 1847.

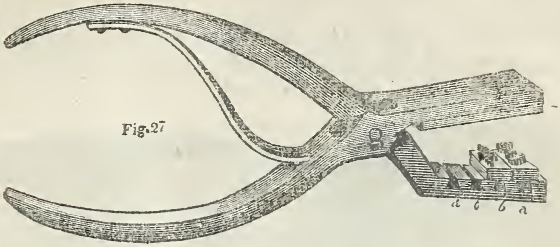


Fig. 27

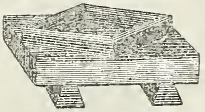
Fig. 30


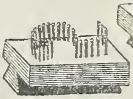
Fig 29


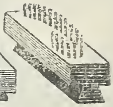
Fig. 28


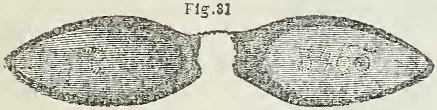
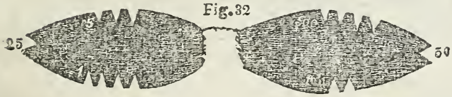
Fig. 31


Fig. 32


1	25	25
3	5	15
4	1	4
4	500	2000
1	50	50
2	100	200
		2294

The same instrument can be used for cutting marks in the ears, by placing, instead of numbers or signs, a cutting iron in the shape of a lozenge with which a part can be cut out from the ear. This method of marking I practised myself very extensively in the flocks of the Count Leinsheim, in Bavaria.

Fig. 22 represents ears marked in that way, making the number 2294, namely:

On the point of the left ear	25
below, four times one	4
above, three times five	15
On the point of the right ear	50
above, 4 times 500	2000
below, 2 times 00	200
	2294

Lambs are marked with small pieces of lead or wood, upon which the number has been stamped, and which are suspended around their necks until they have arrived at an age when the operation of tattooing or cutting the ear is done without injuring them.

VII.—*Instruments for ascertaining the fineness of wool.*

At the agricultural school of Von Thäer, I saw two very simple instruments for measuring the fineness of wool; one was to ascertain the number of curves in a wool hair within an inch.

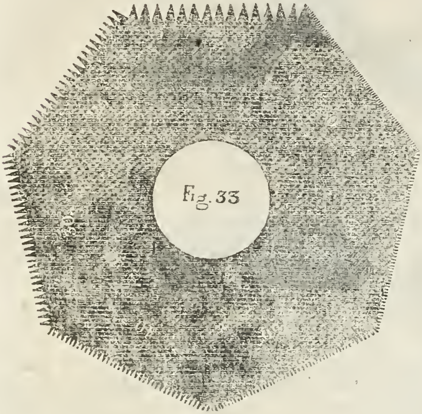


Fig. 33

This instrument consists of a round flat piece of brass or other metal, the circumference is divided into 5 or 6 inches, and each inch forming fine printed teeth; when the number of curves of a hair is to be determined, the hair is placed over it, in such a manner that the number of curves of the hair correspond to the number of teeth on one of the sides of the plates.

Fig. 33, represents such a brass plate.

To ascertain the fineness of a given wool hair, there is used a piece of ebony or other highly polished black wood, in the shape of four-sided pyramid; upon this is placed a fine wool hair from a known celebrated flock which serves as a standard; the given wool hair is placed near by and secured with beeswax; when prepared in this way, the pyramid is removed from the observer until the fine *wool hair* has vanished from his sight, the distance is marked, then the pyramid is moved again until the other hair has vanished; the distance between the first mark and the place where the last observed one has vanished; is likewise marked, and this interval between both marks, serves to compare the fineness of other hairs by. Fig. 34 represents such an instrument.

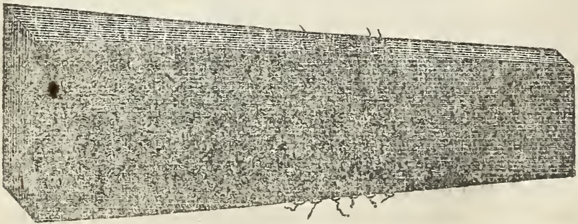
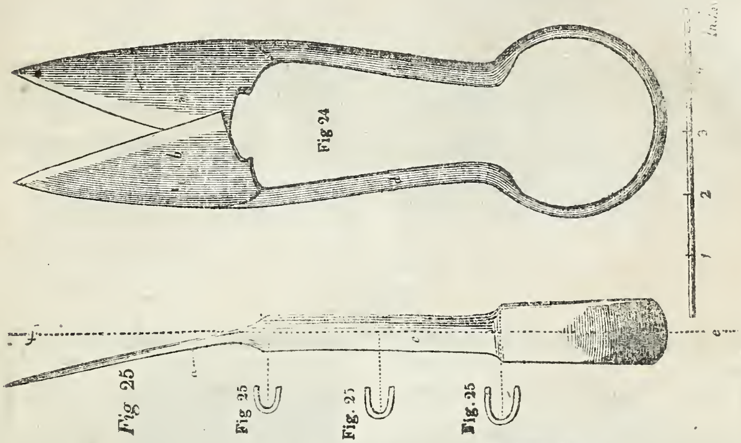


Fig. 34

VIII.—*Wool Shears.*

Well constructed wool shears, are of great importance to a careful wool grower, not only in regard to a greater rapidity with which the shearer takes off the fleece, but especially to prevent cutting the sheep; which is injurious to the animal on account of the wounds which are kept inflamed and irritated by the flies and other insects during the best season, and besides there grows, generally, upon these injured parts a coarse kind of wool or hair, which depreciates the value of the fleece; and that of the animal as a breeder. While I was at Breslau, at the before mentioned meeting of German agriculturists, there were exhibited a new kind of shears, which are now considered the best constructed and are getting to be generally used there. I made an accurate drawing, full size, of such a pair of shears, from which a skilful mechanic can easily manufacture them.



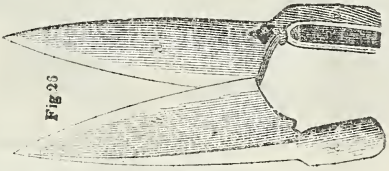


Fig. 24 is a front view. Fig. 25 side view.

Figs. 25 *a*, 25 *b*, and 25 *c*, are sections of part *c* and *d*.

Fig. 26 is a perspective view of the shears.

The shears *a* and *b* are shorter than the common wool shears, and facilitate the shearer in cutting clean from the fold without injury to the sheep.

When a straight line is drawn through the spring *e*, and side piece *a* and *b*, as seen in Fig. 25, the shears deflect from that line at an angle of about 10 degrees. This kind of shears are sold at Berlin, Prussia, Jaegerstrasse, No. 50, from $2 80 to $3 50 per dozen.

IX.—*Sheep Yard and Stables*

The sheep yard in Germany and Hungary, &c., contains the stables for the various flocks, barns for the fodder, sheds for the litter and implements, and the dwelling for the sheep master and his assistants. Generally the sheep stables are connected with the farm buildings, but in many instances these sheep yards form separate establishments placed at proper distances from the main farm, and near the pasture ground.

The situation for the stables is chosen with regard to health; distant from low wet grounds protected from storms, inundations, &c., near a spring or creek for watering the sheep. On the estates of nobles this kind of building is generally of a pleasant appearance and built in conformity to the teachings of experience. They are mostly brick buildings with a tile roof. They are very roomy, and it is generally calculated that 4 ewes with their lambs require a space of 6 feet square, where 6 ewes with their lambs find room, there can be placed 8 wethers or 12 head of yearlings. In a stable where 500 ewes can be housed, there is room for 666 wethers or rams, or for 1000 head of yearlings. The oblong form is found the best, from 30 to 36 feet in width.

Fig. 43

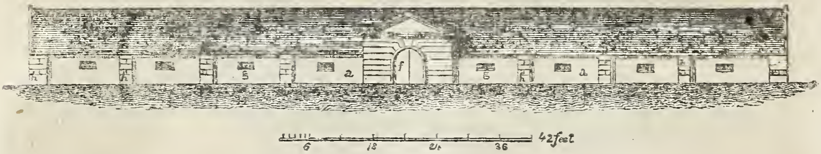


Fig. 44

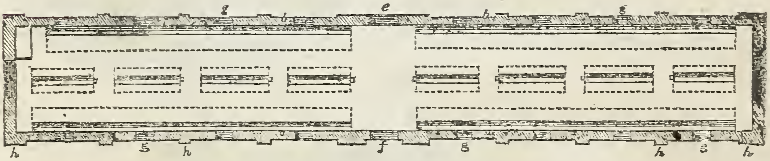


Fig. 43, shows the front view of such an oblong stable.

Fig. 44, represents the ground plan with interior arrangements for the mangers.

The walls *a*, *b*, are 5½ feet high including the foundation; above ground they are 4 feet in height; *c*, *d*, *e*, *f*, are doors; *c*, *d*, are 7½ feet wide and 7 feet high; *c* and *f*, are 5 feet wide and 6 feet high; *g*, *g*, *g*, *g*, *g*, &c., are windows with shutters to slide; the windows are 1½ feet wide and one foot high. The walls are one foot thick; in cold climates it will be necessary to make the walls thick, especially toward the north, and of the stables intended for ewes with lambs.

Every 6 feet along the wall is a pillar of brick, *h*, *h*, *h*, *h*, to give the building more strength.

The construction of the roof is simple. See Figs. 45 and 47; there is a floor to stow hay upon; many sheep breeders prefer stables without floors, because the dust and small particles of hay and straw passing the boards upon the sheep injures the wool.

There are some openings in the roof for the air to circulate,—on each side of the walls are mangers K, one foot wide of the construction. See page 283. Fig. 41, is a side view with the rack let down. Fig. 40, a front view, and Fig. 42, a side view with the rack put up, when charged with hay, and in the position for the sheep to feed from.

In the middle of the stables are similar mangers for two rows of sheep.

During the lamb seasons, the lamb pens are put up in the warmest cor ner of the stable. Fig. 46, shows the mode of putting them together in order to allow room for the shepherd to walk around it, and to see whether the ewes suckle their lambs or not. During the lamb season the shepherd sleeps in the stable near by the lamb pen.

Fig. 42

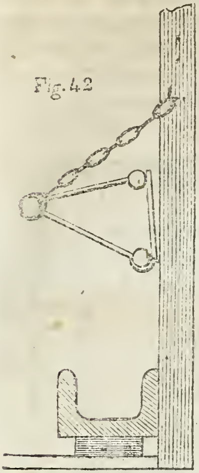


Fig. 41

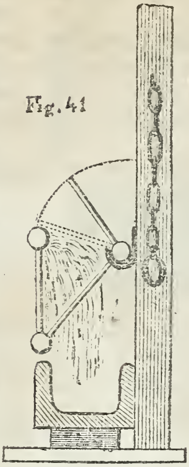


Fig. 40

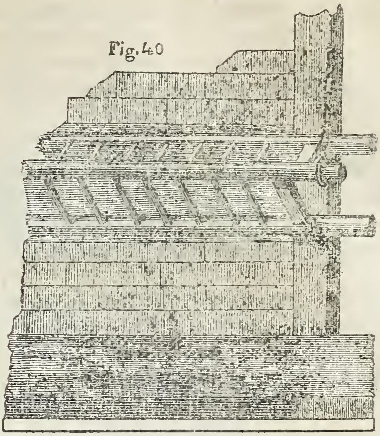


Fig. 45

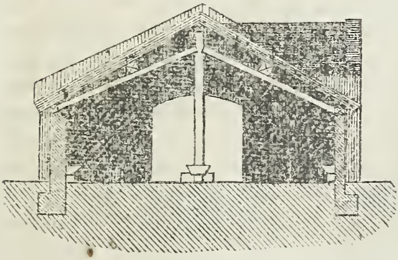


Fig. 47

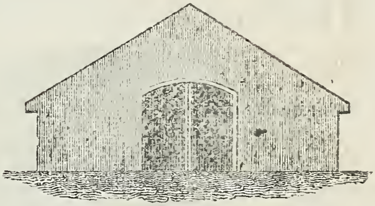


Fig. 46

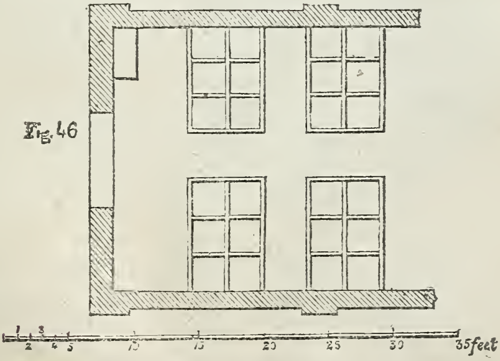


Fig. 49 represents a front view of a stable as it is built at the estate of the vice-roy of Hungary at Alcsúth.

Fig. 48, section showing the blank roof and floor for the storage of fodder. Fig. 50, the ground plan.

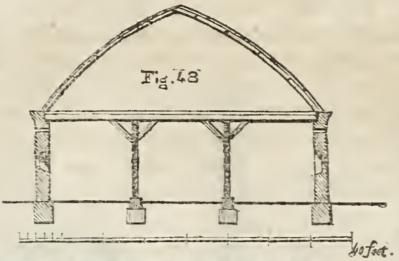


Fig. 48

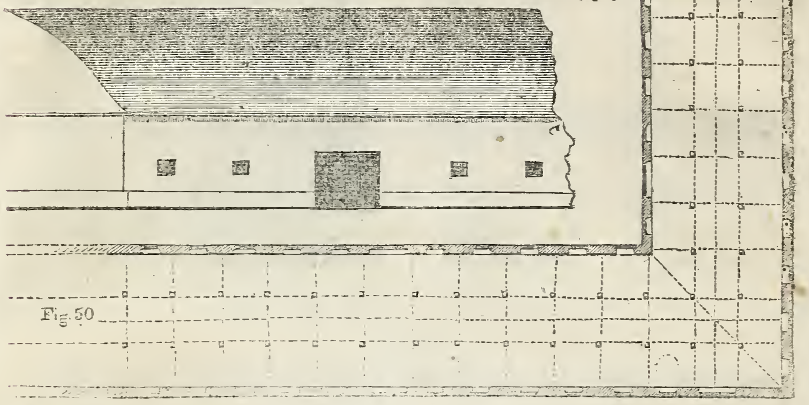


Fig. 49

Fig. 50

At Von Thäer's the entrance at each door of the sheep stable consists of an inclined path, of the width of the door, the object of which is to prevent ewes in a state of pregnancy from being pressed or squeezed against the side of the door on entering the stable. The door is about one foot from the ground, to it leads the inclined path as seen in Fig. 39, and this path holds just as many sheep, as there are spaces between the door posts, should a sheep force its way to the door, it will displace an other on the side, which has to jump off, and take its turn with the rest; whereby no injury is done to ewes in a high state of pregnancy.

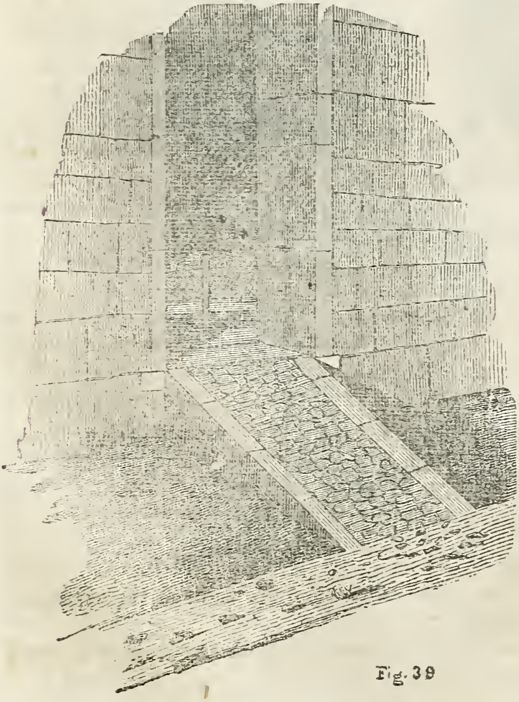


Fig. 39

X.—*General Rules for Pasturing Merino Sheep.*

First. Take good care, that your sheep are never brought upon low wet ground or morasses.

Second. When the localities permit it, there should be a regular change in the pasture lands; for instance bring your sheep—

(*a*) In a wet rainy season or day, upon mountainous or hilly ground.

(*b*) When the weather is dry and clear, feed them upon flat lands or vallies.

(*c*) In cold, stormy weather lead them under the cover of forests or bushwood.

(*d*) In winter, when there is a dry frost and when the ground is free from snow, you may lead your flocks upon wheat or rye fields.

Thirdly. The pasture lands which are considered the best and nearest ought to be used.

(*a*) For the ewes with lambs and yearlings, and for such lambs which have been separated from their mothers.

(*b*) The farthest from the sheep yard for wethers.

(*c*) The sheep intended to be sold to the butcher upon the lowest pasture lands.

Fourthly. Every shepherd must have a good dog to keep the sheep from injuring the crops when they are brought to them.

Fifthly. When the sheep are pastured in vallies, where there is a heavy dew, and the grass covered with spider-webs and other impurities; they must be driven first over the ground upon which they are pastured; the dog is used to drive them over it in all directions; this is done for the following reasons:—

(*a*) The rain carries down from the mountains or hills sand which is deposited upon the grass; in passing the sheep over such pasture lands, the sand is thrown off and the grass is rendered more suitable to feed the sheep upon.

If clay has been deposited upon the grass, the shepherd must not allow his flock to stop at all and feed upon such grass, which would be exceedingly unhealthy for them; he must avoid such places, until the clay has become perfectly dry upon the grass, when the sheep are driven over first, before they are permitted to touch it.

Great injury may be done to the flocks in such vallies or flats, even if there has been no clay deposited upon the grass; when the sheep are fed upon the luxuriant grass after they have received salt but no water, they overload their stomachs and are liable to disease.

(*b*) A certain species of spiders is to be found among the grass, and sometimes in such quantities that they are eaten by the sheep with the grass; this has not however a very bad result but causes a slight purgation. When the sheep are driven over the ground first, the spiders fly to their retreat.

The cobwebs (*filum virginis*) with which the stubble-fields and grass are covered in the autumn, seem to have injurious effect upon the sheep; when a sheep is opened after having fed upon such lands as are covered with cobwebs, there is not a trace of them to be found in their stomachs. When the sheep are passed over such fields or grass land, the cobwebs are taken off by the legs of the sheep.

Sixthly. During the mid-day sun the sheep ought to be brought under a shade or shady trees. When the pasture lands are too far from the sheep yard, there ought to be proper shades erected where trees are not in sufficient number, to give shelter from the sun, rain and hail.

Seventhly. The healthiest pastures should be reserved for the lambs, that the delicate animals, after they have been separated from their dams may find a substitute for the nourishing milk, and not be too much retarded in their growth.

Eighthly. In the spring avoid all pastures, where there are briars, bushes, and woods with short undergrowth; because the sheep will lose their wool in such places; avoid also pine woods, because the pine needles which fall continually from these trees will become entangled in the wool and depreciate its value. After the shearing, such pastures can be used without injury to the sheep and wool.

Ninthly. Nothing is so injurious to sheep and wool as a sudden fright. In the night when they are penned in the open field, and there is a storm approaching with heavy thunder, the shepherd must walk around the pen and talk to them, in order to quiet them. When they get much frightened, they rush to one side of the hurdles upset it and break loose.

Tenthly. In the hot season the shepherd should lead his flock in such directions as to keep the sun behind it; in order that their bodies may give shade to their heads, and he should keep them as far apart as possible, to allow the air a free circulation among them.

Eleventhly. Guide your flocks always slowly, especially on rising grounds. Should the shepherd neglect this precaution, particularly in hot weather, the sheep become overheated and liable to dangerous attacks.

Twelfthly. When the sheep are brought upon the stubble-fields, observe the following rules:—

(*a*) Bring first, the lambs upon it.
(*b*) The ewes; and then
(*c*) The rams and wethers.

Thirteenthly. As it is the rule not to bring the flocks upon the pasture in the morning before the air has dried up the dew and frost; it is also a rule to bring them in the stable or pen when the dew begins to appear.

Fourteenthly. A shepherd should always carry with him—

(*a*) A lancet.
(*b*) A sharp knife.
(*c*) A small tin box filled with tar.
(*d*) Another with sulphate of copper

That in case an accident should happen, he may bleed the animal; or when he observes a sheep to walk lame and he finds the foot heated, indicating a disposition to foot-rot, he may remove the hoof with the knife and apply copperas, over which he has to put a layer of tar.

XI.—*Dimensions to be observed in purchasing Merino Sheep.*

(With a Drawing and Table.)

In purchasing merinos, Petri lays down the following dimensions as important to be observed:—

Plate IV, Fig. 23, is the outline of a merino sheep, with dimensions marked upon it.

1. The length of the vertebra *c*, to the tail root *d*, when taken twice, must

be as long as the whole animal taken from the point of the nose at *a*, to the tail root *d*.

2. The circumference *e* to *f*, of the whole animal, must be as long as three times the length of the vertebra from the shoulders at *c* to the tail root *d*. When these dimensions so correspond, the animal may be considered perfect. The larger the whole circumference of the belly from *g* to *h*, and that of the thighs from *i k*, to *l*, especially when caused by a broad back, and wide spreading hip-bone, the more valuable is the animal, because it yields more wool of the finer qualities.

Very important are a barrel shaped belly, the length of the vertebra from the shoulder *c*, to the tail root *d*, and also the width of the back, because here also grow highly fine qualities of wool. Short legs are considered a necessary quality of a merino sheep, because as on the legs grow the coarser kind of wool, the shorter the legs are, the less coarse wool is produced. Short legged sheep, also feed better on short dry and poor pasture, they travel well and are particularly well suited to mountainous countries.

The ram should have a wide chest, a flat but strong back, short legs, strong knees, broad neck, a heavy folded skin; these various qualities indicate strength and great power in breeding.

The ewe should also possess a large, wide chest, broad shoulders, strong back and a long body, short legs, and resemble greatly the ram.

The following measures will furnish data by which to judge of the various breeds of merinos. They are selected from the valuable work of Petri, a highly celebrated writer on sheep, and an admitted authority in these matters in Germany.

Table showing the form and dimensions of several Spanish merino breeds, in Austrian measures—taken from flocks in Spain by Petri.

Names of the Spanish Merino flocks.	Weight including wool.		Length from the mouth to the horns.		Length from the horns to the shoulders.		Length from the shoulders to the tail.		The whole length.		Circumference of the belly.		Circumference of the shoulders measured from one shoulder to the other.		Circumference of the thighs measured from one knee joint to the other.		Height of the fore-legs.		Height of the hind-legs.		Distance of the hip-bones from each other.		Circumference of the lower part of the neck.		Circumference of the sheep lengthwise.	
From the stocks of the Negretti.	lbs.	oz.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.
Ram	97	..	..	9¼	1	7	2	2	4	6¼	4	1¼	2	10	4	1¼	1	3	..	10	..	6	3	10	6	5
Ewe	67	..	..	8½	1	5	2	1	4	2½	4	½	2	7	3	8½	1	1	..	9¼	..	4½	3	10	6	1
From the stock of Infantado.																										
Ram	100	8	..	10	1	6	2	3	4	7	4	2	2	8	3	9	1	..	..	9	..	6	3	9	6	3
Ewe	70	..	..	9	1	5½	2	1	4	3½	3	11	2	3	3	4	1	..	..	8½	..	5½	3	..	6	..
From the Gaudeloupe stock.																										
Ram	97	8	..	9	1	6	2	2	4	5	4	5½	2	7¼	3	9	1	..	..	8	..	6	3	7¼	6	3
Ewe	69	..	..	9	1	2	2	1	3	11	3	9	2	4	3	2	..	10½	..	6¼	..	4	3	..	5	9
Merinos, Estantes of Sierra de Somo.																										
Ram	96	8	..	9½	1	6	2	..	4	3½	4	2½	2	7½	3	9	1	..	..	8	..	6	3	8	6	2
Ewe	62	8	..	9	1	2	2	1	4	..	3	10	2	3½	3	3	..	11	..	7	..	5	3	1	5	10
Small Merino Estantes.																										
Ram	42	..	..	7½	1	3	1	9	3	7½	3	2	1	9	2	8	..	10	..	6½	..	3	2	4	4	½
Ewe	30	..	..	7	1	1	1	6	3	2	2	10	1	8	2	6	..	8	..	6	..	3	2	..	3	7½

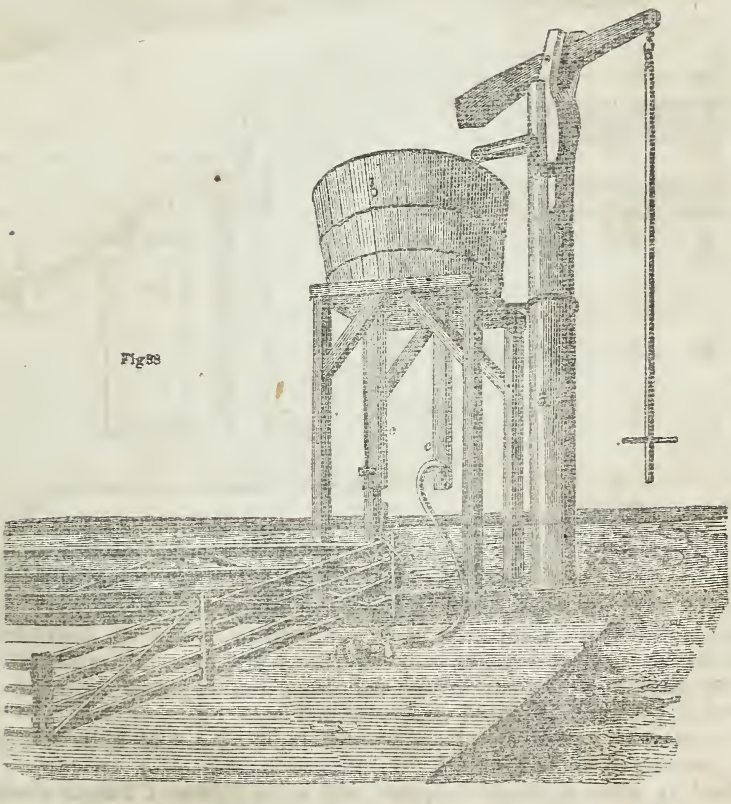
NOTE.—An Austrian pound of 16 oz. = 1.037 lb. avoirdupois. An Austrian foot of 12 inches = 1.234 English foot.

XII.—*Description of the apparatus used at Moegelin and Alcsúth, for washing Sheep.*

(With drawings.)

Mode of washing sheep at Von Thäer's, Moegelin.—To the standard samples of merino wool, which I had the honor of sending to the Honorable Commissioner of Patents, one chart of which he intends to send each of the different state governments, I added some samples of washed wool from the flocks of Von Thäer, which I obtained from that very obliging gentleman, who endeavored to comply in every respect with the wishes of the Honorable Commissioner of the Patent Office, as expressed in his letters commendatory to facilitate me in the collection of information on agriculture, &c. The washed wool from the Moegelin estate has a beautiful whiteness, although the sheep of that country suffer greatly from the dust and sand blown about, which combines with the yolk and forms a thick black cover to the fleece. Von Thäer uses a mode of washing his sheep different from the common river and shower bath washing. At Moegelin the sheep are soaked in a small stream near by the farm; when the water has thoroughly penetrated the coat of wool, they are left in that state until the greasy, dirty covering seems to yield to a second bath; then the sheep are brought under a kind of shower bath, where the water is of a soft nature, taken from a pond of collected rain water. Fig. 38, shows the simple arrange-

Fig38



ment. The pump *a*, is fed from a pond, and lifts the water into a vat *b*, placed sufficiently high to give the water the necessary fall and force to penetrate the fleece and clean the wool. Two pipes *c c*, or hose, communicate with the vat *b*, at the end of the hose is attached a strainer with a stop cock *d*.

When the sheep are ready to be washed, they are placed within a pen *e*, near by, which has a floor of boards to allow the water to run into a pond; one man holds the sheep while another sprinkles it by means of the hose and strainer, until the dirt is removed from the wool.

Description of the Building and Apparatus for Washing Sheep, at Alcsúth in Hungary.

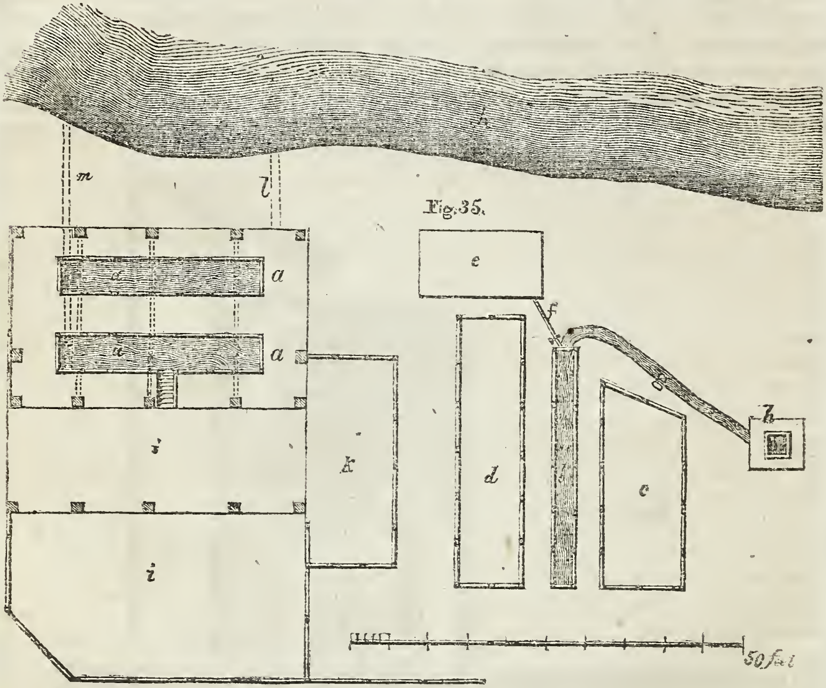


Fig. 35.

The accompanying drawing, Fig. 35, represents the ground plan of the sheep-wash of Alcsúth, in Hungary. When the sheep have been soaked in the warm water vats at *b*, and sufficiently cooled down under the shelter *d*, they are brought into the space *i*, and from thence placed under the shower bath *a a*. When the fleece has acquired the necessary whiteness, the sheep is placed under the shelter *k*.

The water is heated near by in a small building *e*, and by means of a pipe *f*, conveyed to the trough *b*.

The dirty water is let into a square tank *h*, by means of a small ditch *g*. The river, *h*, supplies the shower bath by means of two small conduits *l*, *m*.

Fig. 36 is a section of the shelters *c* and *d* with the warm bath *b*. Fig. 37, is a section of the shower bath.

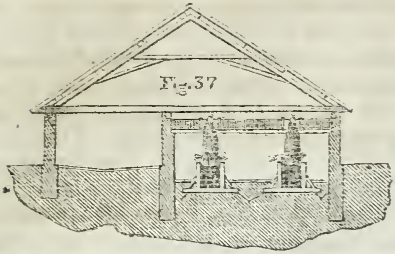


Fig. 37

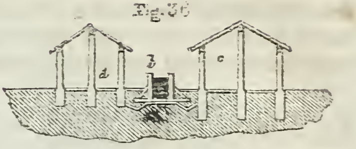


Fig. 36

It is worthy of remark that the process of washing is done under the roof, and, accordingly, no sudden shower or rainy weather can interfere with it. Before the shower bath is administered to the sheep, their dirt and pitch has to be dissolved or loosened. For this purpose a soaking vat *b* is put up, which is covered and tightly fixed together of strong planks or boards. The soaking vat having been filled with hot water 23, 24 Reaumur equal to 84° Fahrenheit, the sheep are placed in two lines and constantly handled, until the yolk and dirt are dissolved, which ordinarily takes from fifteen to twenty minutes. The solvent effect of the hot water is considerably increased, in the first place by mixing with the water while boiling, some potash (say 5 to 6 lbs. to one solution,) and in the next place by the ley, arising from the natural oily matter of the wool. The sheep after being well soaked are placed under shelter, *d*, where they have to wait for their turn of the shower bath, in order that the animal, now too much heated, may not pass immediately from the hot soaking vat into the shower-bath, this being at 13° to 14° Reaumur equal to 61° to 63° Fahrenheit. It must be confessed that the sudden change of temperature, and the application of the vigorous Preisnitz method of sheep washing which is adopted here, presupposes a strong and vigorous constitution as found in the Alcsúth sheep. Not minding the involuntary cold shower bath, they come gaily out of the shower gutter, and in a manner as if boasting of the splendor of their snow white wool, they show themselves at the shelter *c*, which is assigned them and which is thickly strewn and covered with straw. On an average forty sheep are washed in one hour.

The fact, that in the vicinity of Alcsúth, the least wind will raise clouds of dust, and will fill the fleece of the grazing sheep with black sand to the skin, must add to the trouble and expense of the washing, and besides renders a correct estimate of the fineness as well as the other qualities of the wool extremely difficult. Those animals whose wool has not been well cleaned from this dust by the shower-bath, are wet with a ley which is kept in readiness, and which is made from Preiss' vegetable wool wash; and twenty-four hours after they are again put under the shower, which will then give to the fleece the brightest appearance.

Experiments have been made also with the Packner wool wash. The wool to which it had been applied, was exceedingly well purified indeed, and snow white; but then the fleece had become rough and been deprived nearly of all fat. The ingredients of this fluid have never been made known by its inventor.

The oily matter which settles at the bottom during the washing, is let off by means of a small gutter, is collected and conveyed in casks upon the meadows, which being done after haying-time, when the season is usually quite dry, is of much value to the crop of hay.

At a distance of about 300 steps from the establishment for the washing of the sheep, upon a gentle height which commands the whole valley, lies the handsome building for the shearing of the sheep. With its high roof of boards and its many windows, it is well lighted, airy, and sufficiently large to take in from 150 to 160 shearers at one and the same time. The shearing is done by women who possess great skill in shearing. The wages paid for shearing is from 15 to 25 cents, the last being paid to those who shear both quick and handsomely. The rolling up of the fleece and the collecting of the pick-wool is done by boys and little girls, the former receiving 9 cents, and the latter 5 cents, or its equivalent Vienna currency.

XIII.—*Wool Growers' Convention and Wool Markets.*

In the historical sketch of Silesian wool culture, we have seen how many years it took those intelligent and industrious wool growers to obtain that degree of perfection in the wool of their flocks, which corresponds with the demand of the manufacturers, as well as with those of the wool growers.

It required time, experience, and mutual understanding among the wool growers, manufacturers and wool traders; to effect this they held conventions as early as 1814, when the wool growers of Germany, and such persons as were interested in this branch of husbandry, met at Brun, for the first time, to consult, exchange their views, and adopt general terms and rules for the accomplishment of the desired object.

Von Thäer succeeded in calling together a similar convention, which met at Liepsic, in Saxony, and several other societies adopted the same beneficent measure.

The principal object of these conventions was to accelerate the merino wool culture, to exchange their views and experience in breeding, feeding, washing, shearing, &c.; to take into consideration the demands of the wool merchants and woollen manufacturers, and in this way the German wool growers have attained to their superior results.

By samples of wool from various flocks in different parts of the United States, that have come to my notice, I have found that there exists no decided character in the wool of this country; in every flock, no doubt there is wool of different character, and very few are perfect in their kind.

This vast expanse of country, of various climes, soil and more or less favorable localities for sheep breeding, must naturally produce different kinds of wool; and it would be highly important to the wool growers of the east, west, north and south, to meet once a year, and bring with them, if possible, some of their sheep, or when the distance is too great, at least a number of entire fleeces in a washed and unwashed state; these fleeces ought to be exhibited with a label indicating—

1. The section of country from which it comes;
2. The kind of pasture—high or low grounds;
3. Length, height and circumference of the sheep;
4. The sex;
5. The age of the fleece in days;
6. Weight of the animal;
7. Weight of the fleece in unwashed state;

8. Weight of the fleece when washed;
9. Origin of the animal.

These data will facilitate the wool growers in judging of the fineness, evenness, form of the staple, and all those indications, by which a thorough blood can be noticed; for it is only by comparison of wool from the various parts of the fleece we can ascertain the value of an animal.

The wool growers should be furnished with samples of the best Silesian breeds, to enable them to compare the wool of their flocks by, and should there exist faults to discern the mode of remedying them in the shortest and best manner.

I have sent the honorable Commissioner of Patents several charts with samples of the best Silesian, Hungarian and Saxon wool, which I collected during my journey through those countries. Such a chart will enable the wool-growers of the United States to make comparison with the wool of their flocks and ascertain the difference existing between the wool of their sheep and those of Silesia.

At the yearly meeting of the German agriculturists, this important branch is ably discussed, and all new improvements in the mode of breeding or growing wool are made known and published.

The wool markets afford another opportunity to the wool grower to become acquainted with the progress in the wool culture, and the demands of the manufacturer.

Germany has at different places regular wool markets, where, on certain days of the year, the wool of a whole country or district is brought together for sale.

At Breslau is the most celebrated wool market; it is celebrated not only for the finest wool being found there, but for its being one of the earliest in the season where the greatest quantity of excellent wool is offered for sale. The next important ones are at Berlin, Stettin, Magdeburg, Dresden and Leipsic.

At Breslau are sold every year about 60,000 cwt., of which

			Reicthalers. Dollars.	
3,000	cwt. are of the finest quality, and averages	about	130=98	per. cwt.
4,000	"	"	110=77	" "
5,000	"	"	100=70	" "
10,000	"	"	90=63	" "
15,000	"	"	80=56	" "
15,000	"	"	70=49	" "
8,000	"	"	50*a*60=35*a*42	"

Amounting to 4,920,000 rix dollars at 70 cents the rix dollar, equal to $3,444,000.

This shows that even at that market, where all the wool of the whole province of Prussian Silesia is sold, the greatest part of the wool offered for sale is wool of the middle quality, and that the amount of the high priced qualities is small in proportion to that of the lower priced ones.

These markets are visited by the manufacturers and wool merchants of England, France, Belgium, Russia and various other parts of Europe. The finest, best assorted, well washed, and that which is carefully packed, without having recourse to plaiting, or increasing the weight by moistening it, &c., brings the highest price. It is, therefore, an object with the German wool grower to prepare his wool for market in the best style. The wool grower has an opportunity at these markets to become acquainted with all the different kinds of wool grown in his country; he can obtain a correct knowledge of what is in demand, and he is enabled to learn the best mode of breeding, washing, packing, &c.

Similar markets will become necessary in the United States, because here the wool growing regions are too extensive. The wool growers of the west, for instance, are too far from the eastern markets. On the other hand, the manufacturer is not able to visit all the flocks over the whole Union in order to become acquainted with the products of his country. The wool grower, remote from the great mart, is ignorant of the true value of his wool, and depends entirely on the neighboring merchant, who obtains it generally for a low price, whereby the wool grower becomes discouraged. Had Ohio, for instance, a wool market, where all the wool would be brought together from that state at one point, say Cincinnati, the manufacturer of the east would find it advantageous to visit that market and purchase such wool as he requires for his fabrics, and the wool growers who grow better qualities could obtain such prices as they deserve—they feel encouraged, try to improve their flocks, and gradually furnish the manufacturers of this country with a wool he now has to purchase in the foreign markets.

XIV.—*On the Wool Trade of Germany, and other countries.*

The following articles from the pen of J. G. Elsner, a distinguished agricultural writer, who has devoted his long life to the subject of wool and the wool trade of Germany and Europe, is believed to be well worthy of being submitted to the American wool grower, as showing in a very short space the views of the German wool grower on this important branch of agricultural industry. He thus becomes acquainted with the state of the present German wool market, and their speculations for the future, and he will see therein the principles which they have laid down to be guided by, in order to retain the reputation of their markets. It will be difficult to take from Germany the palm, having already a superior improved breed of merinos, well informed and attentive shepherds, and highly industrious wool growers. But Mr. Elsner is mistaken in the belief that highly improved sheep do not last well in the United States. The fact is, we have yet had very few highly improved sheep imported, and the few which were brought here have been neglected in consequence of the want of knowledge or that indefatigable attention which the merino sheep requires. As far as my own observation goes, I have found that the wool grown in the United States has a remarkable softness. I have not yet seen wool from highly improved sheep. The samples which came under my notice were, with the exception of a few instances, from good half-bloods, but even that coarse kind had a high degree of softness.

Why should not we, in countries like Virginia or Tennessee, where nature has done every thing for the sheep; given an excellent soil, which produces the best kind of grasses; a climate like that of Italy, only a few weeks winter, where the sheep must be housed and fed;—why should not we, with such advantages, produce a wool which can compete with European wool, of a similar degree of fineness, in cheapness? We must first, however, learn how to grow an even, well stapled fleece; we must learn how to wash it well, and how to assort it and pack it well.

In order to show the wool growers the extent of consumption of wool in this country, exceeding the amount grown, I have obtained from the office of the Register of the U. S. Treasury the annexed table. It will be seen that the wool imported for the first two quarters of 1847 amount to three millions and seven hundred and two thousand pounds:

Imports of Wool from 1840.

	Not exceeding 7 cts. per lb.			Exceeding 7 cts. per lb	
	Value.	Quantity.	Value.	Quantity.	Value.
1841 to September	1,091,953				
1842 to " *	797,382				
1843	3,632	3,332,654	190,352	184,446	54,695
1844 to June		13,808,645	754,441	199,763	97,019
1845 "		23,382,097	1,553,789	450,943	130,005
1846 "		16,427,952	1,107,305	130,295	26,921
1847 from June 1, to Dec. 1, 1846		4,133,444	288,433	39,087	4,067
1847 to 30th June (new tariff)				†3,702,379	224,565

*Quantity not given. †As unmanufactured wools.

Amount of Capital engaged in the Wool Trade of Germany.

It is by no means easy to give an exact statement of the number of sheep kept in Germany. According to the statistical tables published from time to time, they exceed thirty millions. On an average, 100 head furnish yearly two cwt. of wool; and if this amount be not fully attained every where, the deficiency thus arising is made up by the excess of sheep above thirty millions. The yearly production of wool may therefore be set down as amounting to 600,000 cwt. Not that this entire quantity, however, comes into market; for a goodly portion thereof goes from the hands of the grower directly into those of the consumer; as is particularly the case with the inferior sorts. I cannot be far from the truth, when I estimate the quantity thus passing directly into the consumer's possession at one-sixth of the entire production, so that there are left for the market 500,000 cwt. As to the average prices of this quantity, it must be observed that it is made up of two different classes of wool, viz., wool of northern or of southern Germany, the former of which is by far the most valuable. To the first of these two classes belong the markets of Silesia, Pomerania, Brandenburg, Saxony, and Magdeburgh; and it should be noticed here that the breeding of sheep in the northern provinces, being carried on upon a much larger scale, the amount of wool grown in the north is far greater. Still the difference which thus arises is made up again by the territory of the southern provinces being so much larger; for with the southern provinces I also class the western portion of Germany, viz., all the Rhenish provinces. I have made this division of Germany in accordance with the quality of the wool, and hence have reckoned to northern Germany also Moravia, which is made a competitor of Silesia and Saxony, and in this manner the proportions will be pretty equal, so that I may fairly set down for either 250,000 cwt., or one-half of the wool brought into market. The prices for the last six years (previous to 1845) having been in northern Germany, (on an average) 65 Prussian thalers, (equal to $47 50*,) a cwt.; the 250,000 cwt., amount to 16,250,000 thalers, (equal to $11,375,000;) while those for southern Germany, on an average, are 10 thalers, (equal to $7,) i. e. amount to 55 thalers (or $38 50) a cwt., which makes for the south a total of 13,750,000 thalers. Hence there circulates in Germany in the wool market every year a capital of 30,000,000 thalers, (equal to $21,000,000,) in which 100,000 cwt. of wool are not counted, which are sold by the producer directly to the consumer, and which, if set down at four millions of thalers, (equal to $2,800,000,) would certainly be rated too low.

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* Reckoning the Prussian thaler at 70 cents

XV.—*On the Export of Wool from Germany, &c.*

The yearly export of wool from Germany is already of considerable extent. To give a correct idea of it, we will state the countries to which it is exported. *England* continues to bear the sway as heretofore. Her purchases in the German markets, although they are no more than what they were a few years back, are to such an extent as to influence, nay, determine, the prices of wool. Now, the English buyers (as has been found of late) are in search more of the middling than of the superior sorts of wool, and on the ground of this observation it has been asserted that the raising of middling wool will in future be more advisable, and reward the owner better than the raising of fine quality. Should this opinion become general, it would give a deadly blow to wool production in Germany, since, as I have shown, it is only the excellence of their wool that can secure them customers, and that can keep up this branch of industry so as to remunerate the proprietor. In order to understand correctly what the English purchasers are attempting in their inquiry after middling sorts, it will only be necessary to observe which of the middling sorts they really select. It then will be seen that it is the wool of those flocks which are of a particularly good breed, namely, such as is obtained from flocks of noble descent, and as are constantly improving, and where, at the same time, by means of a superior treatment, an article in every respect valuable is obtained, and this, considering its relative fineness, at a fair price. The English find it to their great advantage to buy these kinds of wool, and they seize upon them in the very sight of the less clever domestic purchaser; and they themselves admit that the Silesian wool possesses in an eminent degree all the qualities required for their manufactures. Shrewd merchants as they are, they soon discovered that it is most profitable for them to buy the middling qualities, that by being carefully sorted out, will increase their profits. The yearly import of wool by England from Germany may be estimated at from 20 to 25,000 bales, at four cwt. each; hence it would make about one-sixth or seventh of the entire production, but for the fact that under the name of German wool a large quantity of Hungarian, Polish, and Russian wools, is sold in the wool markets, and is called in the lists of exports to England. The latter report, when reduced to what it actually is, can scarcely amount to 15,000 bales (or 60,000 cwt.,) hence about the tenth part of the entire production of Germany.

The Dutch and Belgians, as the foreign customers of Germany for wool, rank next to the English. They are much older customers than the latter, although the quantity they buy is not so large. Of late they likewise inquire more frequently after good middling sorts, than those of the finest qualities. The latter, however, are bought especially by a few houses of Belgium and French Netherlands, for which good prices are paid. The wool dealers of these countries go in person to the German markets to make their purchases; still, at the same time most of them have some friends among German firms of inferior rank, to whom they give their orders and instructions, and who, as soon as the least prospect for a favorable period of business turns up, are regularly the first to lay hold upon such well known shearings as best suit those wool dealers and manufacturers. Upon these, Germany calculates for the future as her old and certain customers with greatest reliance, because they cannot, like the English, withdraw from the market at any moment when a favorable opportunity offers elsewhere.

The *French*, also, have lately come into the German markets; they buy chiefly of the best and finest wools. Indeed they, also, formerly sometimes came to southern Germany, to buy clippings, through the dust and heat. Still their trade did not amount to much. Far larger is the amount which they get from Germany via Frankfort, (on the Maine,) although from second-hand sellers, but for which they ordinarily give no high prices. A great part of this wool, indeed nearly all of it, is not of German origin, but is raised in Hungary. Netherlands and France together, probably, buy in Germany a quantity of wool equal to that taken by England alone, and as th [illegible] ne-tenth of the entire production, the sale to those three countries, amounts to one-fifth of the entire production.

Russia is quite an unexpected visiter, that of late has come into the German markets, and the superior clippings go now to that country, especially to Warsaw and Riga. The quantity sent thither is comparatively small, yet the prices obtained are high. The manufacturers of those two cities buy the most costly wool, and for the most part it is thither that the wools at 130 to 140 thalers $91 to 98 a cwt. are sent. This fully makes up for the money going from Germany to Poland for low sorts of wool.

Moreover, it should not be overlooked, that a considerable portion of the foreign wool trade is merely *transit* business; for many German and foreign wool dealers purchase large quantities of wool in Poland and Russia, sort them in their German storehouses, dispose of a good part of the country wool, but mix also, much of it with German wool and send it, under the name of German wool, to foreign countries. This does not injure the wool production directly, yet indirectly it does. For in the first place, it makes the quantity produced by us appear larger than it actually is, and in the second place, it can surely do the wool production no good, to have the reputation of the fineness of German wool disparaged, by selling under the name of German wool an article much inferior in value and of no commendable properties. It is to be apprehended, too, that this fraud will gain ground more widely in future, the more other countries endeavor to imitate Germany in producing a constantly improving species of wool.

In order to form a correct conclusion respecting the future prospects of the German wool trade, from the way and manner in which the German export business is carried on, at present, it is necessary to explain the mode to those uninformed.

Wool to go abroad is very rarely done up in "shepherd's bundles," as they are called; but for the most part it is previously sorted and dressed at the warehouses, where the different sorts of wool, according to kind and quality, are separated and assorted and packed up. Herein many artifices are made use of by those who do not scruple to resort to them, of advantage for the time to the one who adopts them, but which injure the business and in the end must cause distrust of purchasers abroad. Honest wool dealers, of course, disapprove of such conduct, and never participate in it; yet, though they will keep up the confidence of their old customers, they at any rate must suffer in this respect, that, owing to the prevailing distrust, it is not easy for them to find new ones. One of those artifices very frequently resorted to is, the *so called plating*, which consists in wrapping up the bale in some very fine fleeces, so as to make it appear, as if the bale throughout is of that excellent quality. Plating, as it is called, when done with wool evidently superior to that really contained in the bale, is certainly nothing but fraud. It is very well known that there are German wool dealers who carry on business in that way; and who for this purpose buy superior clips in Saxony and Silesia, in order thereby, the more easily to succeed in selling those less valuable from other German provinces or even from Hungary. Yet, if there is any thing to secure the German wool business in foreign countries, its continuance and prosperity for the future, it is only by the strictest honesty which in days past was always associated with the name of Germans and of Germany.

On the future prospects of the German Wool Trade.

A comparison between the production and consumption of Wool.—We cannot form a correct idea of what is likely to be the future state of the German wool business, without an accurate estimate of its actual production and consumption. To judge then of the future prospects, we must first show what is the *present state.*

We have already given an estimate of the amount of wool yearly produced in Germany. Whether a great increase of this quantity be possible and probable in future, is highly questionable, as we mean to show further below. The yearly production, as we have said amounts to 600,000 cwt. It would be a difficult task to ascertain by the bills of sale, how much the domestic consumption amounts to, and even if it was made out with the help of statistical tables, but little reliance could be placed upon it. The surest standard after all, are the lists of export and import of raw wool. According to these, Germany imports a larger quantity than she exports; hence the consumption exceeds the production; and since with the increase and enlargement of her manufactures, the consumption continues largely on the increase, it will be plain that for the domestic production, so far, a very favorable future can be anticipated, which, as a matter of course, will extend also, over the wool trade.

We shall have to consider the several German provinces each by itself:

In Austria herself and her other German provinces, the demand of the manufactures goes far beyond what they themselves produce; for they obtain a very considerable quantity from Hungary and Gallicia, and they do not by any means export an equal quantity of their own wool. The German provinces of Austria import from Hungary, if not more, at least a quantity equal to three-fifths of their entire wool production, say about 100,000 cwt. The imports from Gallicia, indeed, are much smaller, but will exceed 20,000 cwt. On the other hand, the exports of those German states in question, can scarcely amount to more than half that quantity, i. e. 60,000 cwt.; and a great portion of it is wool imported from Hungary, consequently merely in *transit.* That imported quantity is consumed by the many flourishing manufactures of Austria, Bohemia, and Silesia, in addition to the considerable amount of their own production. At Brünn alone, the capital of Moravia, nearly the entire wool production of Moravia, is worked up; Reichenberg in Bohemia and Bielitz in Silesia are likewise foremost in this branch of industry, and there is a large number of cities and towns that carry it on upon a similar scale, so that it becomes quite intelligible, how the German provinces of Austria can consume about 200,000 cwt. of wool a year.

It is self-evident that this enormous consumption cannot be confinea to the domestic want. Thus for example, the wool imported from Hungary in a great measure goes back, changed into goods; and much of it goes farther down to the Turkish provinces. Gallicia likewise imports a quantity of woollen goods from Austria, equal to what the latter can produce from the wool she imports from Gallicia; and in the Italian provinces also, the Austrian woollen manufactures sell extensively. Accordingly the German provinces of Austria, in relation to the other provinces of that empire, play, in manner the part of England, which imports far more raw material than she herself consumes, and exports the balance, changed into manufactures, to foreign countries, which it is evident must be very lucrative.

If we now go to *Bavaria*, as next in order, we find that her demand of wool cannot be fully supplied by her own production, and although she receives from abroad little or none of the raw material, she receives the more of woollen goods. I cannot state, precisely, the extent of the active and passive commerce of this branch of business, and mere conjecture would be of little value.

In *Wurtemberg*, the proportions of production and demand of wool are much more favorable, for manufactures there are in a flourishing state, and much is sent abroad. Sometimes, even quantities of raw wool are exported to France, but this is constantly made up by the excess of imports.

Of *Baden* very much the same may be said as of Wurtemberg.

In the smaller states on the Rhine, to the lines of Westphalia, the consumption of wool and woollen goods by far exceeds the production, and they are extensive customers to the much more productive provinces farther east.

In *Prussia*, owing to the flourishing condition of her manufactures, the consumption of wool, though but recently, has reached almost the same extent as in Austria. Only in Rhenish Prussia the consumption has long since become so large that great quantities of wool are every year imported from the eastern provinces as well as the adjoining states.

In the province of *Magdeburg*, in the *Marches*, and in *Silesia*, however, the consumption of wool also rapidly increases, especially of the finer kind, which is much required by the manufactures there, so much so that these provinces consume nearly all of their extensive production; the quantity of wool sold by them to other countries being replaced by importation.

It appears, then, from the foregoing, that the consumption of wool in Germany, much exceeds her own production, hence the latter must be considerably increased if she is to be able to meet her own demand. It is quite an unnecessary fear by which the timid minds distress themselves, of those who dream of a surplus from over-production; for while our manufacturing industry does not decrease, but grows in extent, even the largest amount of production will not suffice to meet the demand, and we shall be under necessity constantly of importing from the neighboring countries.

How much public prosperity must be benefitted thereby is obvious, for manufactures, as every one knows, possess a vastly greater value than the raw material. The question then, whether Prussia and Hungary, by the quantity of wool they produce, can drive us from the market, is not so serious as this, whether they may not, in time to come, compete with our own woollen manufactures.

To apprehend an excessive production of wool, is altogether chimerical: for, in the first place, as to the present time, there is rather a scarcity of wool than an abundance, so that not only the shearings of this year (1845) are sold rapidly, but even the old stocks which had accumulated are disposed of; and, in the second place, it is undeniable, that when wool formerly was thought to be in abundance, it was only in consequence of the prices being too high, which had the effect of limiting the consumption and making room for the surplus. But as soon as prices return to their right level, in just proportion to all other produce, the consumption immediately increases again, and the old stocks are cleared out. The present increased demand for wool, indeed, according to some, is owing partly to the deficiency of production in the sterile year 1842, and partly to the favorable turn of commercial affairs. Both certainly had great effect, although the true explanation of that enlarged demand is found in the fact that the consumption has again increased, in consequence of the lowered prices of the raw material.

We now propose to compare the production and consumption of wool in *other countries* besides Germany. The most extensive consumer of wool, as is well known, is *England*. Enormous are the quantities which she imports every year, as may be seen from the lists of importation, and yet what she raises by her own sheep breeding, is even of far greater extent. Compared therewith, the large wool consumption of Germany, indeed, appears to be only trifling. This being the case, an increase of production in this or that country, is not of so much consequence, as long as political or mercantile events do not exercise an unfavorable influence upon manufactures and commerce. For example, Australia now produces and exports to the English market 30 to 40,000 bales every year; although this is a considerable quantity, yet in the great consumption, and with the constantly increasing manufactures, it is of no such great effect as might be supposed from its amount.

In *France and Belgium* the consumption of wool is on the increase; on the other hand, its production is limited, especially so in the latter country. Hence both countries have to go abroad for supplies, and in the first place they apply to Germany.

All the remaining states of Europe, at the present position which their manufactures occupy, do not meet their own demand of woollen goods, and they indirectly continue tributary to the manufacturing countries by their demand of wool, although they pay this tribute unnecessarily by the raw material.

Of the *wool producing* countries I will mention only those which do not consume entirely what they produce of the raw material, but export a large portion thereof, and which consequently turn the scale both as to the production and the trade of wool.

Of *Germany*, I have already spoken. There remain only these five countries to speak of, viz: Spain, Hungary, Russia, Polynesia and North America. Taken together, these countries represent the principal wool production of the globe. Whether in time to come some provinces of Asia may likewise join, only the future can tell, though we think the time is not far off.

The enormous extent of the consumption of wool, as also the probability of its future increase, has been shown, and we have seen that the question is not so much whether the production will exceed the demand, as whether there is reason to believe that there will always be sufficient production to meet the demand. We have therefore to examine to what extent, in the course of time, the production can attain.

Respecting *Germany*, I have already expressed my doubts in regard to a considerable further enlargement of her wool production. The quantity cannot be extended there without interfering with other agricultural de mands, so that nothing more can be done than to improve the quality. This course we must continue to pursue steadily and uniformly, in order not to impede others, nor to be disturbed in our own course. Such being the circumstances, other wool-growing countries have little to apprehend from us, because the customers for our wool would buy none or only little of theirs. The question, however, whether in regard to our wool there is the right proportion between production and consumption, and whether this will remain so for the time to come, may be answered in the affirmative without any hesitation whatever. For, with the increase of culture and civilization, the demand for fine fabrics increases, and hence also that of improved wool; accordingly if there were room for any apprehension, it would be much rather for that of an imminent scarcity than abundance. Still there is no cause for such apprehension, since the production of improved wool is on the increase also in other countries besides Germany, and although this be on a small scale only, it will suffice to make up for the deficiency.

As regards *Spain*, we will first glance at her past and her present condition, before venturing to draw any conclusions as to her future production of wool, and as to the weight she is to throw in the scale of the general wool production. In former times, as is well known, Spain was the only country that produced merino wool. She once watched this golden branch of national industry with such zeal and care that the export of merino sheep was made a capital crime; time has since changed, and later events have done away with that measure, and so completely has Spain lost her monopoly, that, at present she occupies only the second rank in the production of superfine and super-excellent wool—nay, she has even made attempts at renewing and improving her much deteriorated merino breed by breeds obtained from Germany. Although this can only have been an experiment, since for a thorough procedure of the kind, some few head would amount to nothing, yet it affords us at least this satisfaction, that we have overtaken the mother country of the merino sheep, and that, with our way of proceeding, we not only need not fear to be out run, but are quite certain to gain still the more advantage of her. Political convulsions have deprived Spain of her golden fleece, and she will find it hard to recover the same.

Still, we should not feel too secure, for Spain, a century back, likewise, did not dream that her great treasure could be purloined. The materials she still possesses in her flocks, although these have degenerated, and been mixed with foreign blood, and nothing more is necessary than that a great man rise up to make of them what they might be. She has for this the great advantage of her exquisite pastures, and we need only recollect, how, among some flocks in Germany, which by ignorance or carelessness, had sunk from their high standard, all wishes and hopes were brought in being, when the right man was found to do it. As regards Spain, the German wool growers should keep this constantly before their minds, since that is the quarter from which most danger threatens, for, I must repeat it, our country has not to dread the over-production of foreign countries, but the possible event that some one of them should produce a like quality. Moreover, also, the quantity of the wool production of Spain is capable of the most capacious increase, notwithstanding the repeal of the "*mesta*," and no doubt it will acquire an immense extent, after the political convulsions shall have ceased, and have made room for a more stable order of things, which in the course of time will revive industry and commerce in all branches, and will develope facts that may startle many countries.

Hungary has very often been pointed out to our wool growers, as the country of rivals most to be dreaded. This is certainly no mere imagination, if we consider, that the qualities already offered by her in the market compare well with the best German wools. In the yearly exhibition of merino wool, at Vienna, where, ordinarily, none but the most select of all the highly improved flocks are sent, several specimens from Hungary, were not only found to be fully equal to the best, but were near being preferred as the superior. It is true, only single sheep breeders have met with such brilliant success; still, it at least shows, what the country may be able to do, after experience and intelligence shall have become more general in this branch of industry. My familiarity with the subject, and the great importance which it has for Germany, will justify me in devoting to this country more attention than to any of the rest.

The agriculture of Hungary and the countries belonging thereto, in general, and according to appearances, favors very greatly the breeding of sheep. The large possessions owned by some of the "magnates," and the healthy pastures very much encourage sheep breeding upon as extensive a scale as is found here. Its extent is already greater than is known abroad. Statistical tables being not much thought of there, and the large proprietors being the sovereign rulers of their possessions and having great dislike to being watched, it is extremely difficult to obtain a correct view of the entire stock of sheep kept in that country. Hence it is that the estimates vary so greatly, and that, while some speak of only eight millions of sheep, others estimate them at twelve millions, and even more. The latter estimate, no doubt, is by far nearer the truth than the former, although, even this, I think to be too low, rather than too high. For my own part, I think that Hungary and the territories adjoining, number nearly fifteen millions of sheep. Only a small portion of them are of the full blood, but those of the half bloods are very numerous. The fact, that on the imperial estates of *Holitsch* and *Mannersdorf*, the first merino sheep were placed, that the empress, Maria Theresa, had brought to the country, procured the "magnates" a convenient opportunity for improving their flocks; indeed, sheep breeding soon came to be regarded as a matter of honor. Large sums were expended upon merino bucks, and the time is well remembered yet, when one out bid the other in an almost incredible manner. Much was effected thereby, though not all. The original country sheep, which very nearly resembled the *zackel*, are so much improved, that from their offspring a wool is obtained which, in the wool markets, in a great measure, is counted among the lower middling sorts of improved wool. The prices, indeed, are not high, when compared to those we receive for our German product; still they pay well, when we consider the local relations of Hungary. They are, according to their treatment and degree of improvement, from 55 to 100 florins, Vienna currency, (about 25 to $50.) The very low sorts, to which, also belongs the zackel wool, are here of no account, since they cannot, in any way, compete with the German wool.

The question now is, whether those middling sorts, in case a higher improvement of the flocks should succeed, might not advance so much as to compete with the German middling sorts? It is easy to answer this question, and the reply must be given in the affirmative, the more so, since the better ones of them do so already. For the Austrian-German manufacturer long since used them, and the fabrics made of them, are just as good as those from the common German middling sorts. The better treatment, in washing and shearing, has, of late, done much to make those Hungarian wools better liked; and to this circumstance it must be attributed, that the markets of Pesth are attended by English, French and Dutch customers, which was not the case. They make somewhat extensive purchases, and if the reaction upon the German markets, and their stocks of middling wools, is no more felt, it is owing to the generally increased demand. The danger that threatens Germany, as may be seen by the failure just noticed, is not, then, so very great; although a very considerable extension of production, which, though not likely, is at all events, possible in Hungary, might cause a depression of prices, in consequence of the supplies too largely accumulating in the market. Still, even in this respect there is little cause of uneasiness, as shown by the increasing consumption. Yet, how is it with the better, especially the finest qualities? According to fair reasoning, what several persons have succeeded in doing, cannot be considered an impossible task to others. And if, even in the present case, this should not apply to a whole country, since all parts are not favorable to highly improved sheep breeding, the conclusion, at any rate, may be realized in those parts where there is no natural impediment and where highly improved flocks already exist, and furnish actual proof that their thriving there is not impossible. However, in order to raise merino sheep, we require, not only a favorable soil, but there is also another important requisite, viz: *intellect.* There appears to be a much greater deficiency in this latter respect, in Hungary, than in Germany. This alone, accounts for the fact, that Hungary, although the merino sheep were introduced there at a much earlier period than in Germany, and although her pastures are so extensive, so well adapted and so cheap, has, nevertheless, only a very limited number of highly improved flocks.

One might suppose, that in the course of time, these flocks would be followed by many others, and that the quantity of highly improved wool would be much increased in Hungary; yet I do not think this at all likely. For, in the long space of time since merino sheep have been raised, their breed, (notwithstanding the extensive pecuniary resources and the physical advantages which the country offers,) has made so little progress, that, unless unexpected favorable changes should take place, the wool production of Germany, indeed, has little to dread the progress in Hungary. Yet it will certainly be best for us not to think of it too lightly; we must continually watch the wool growers of Hungary, in order not to be unexpectedly surprised. As the circumstances are, Hungary, in any case, will retain a very great influence upon the wool production and trade of Germany, which is much more likely to extend than to decrease.

However, while things remain in their present state, there is certainly less danger than there would be if that country should awake and foster trades and manufactures, which would not only enable the people themselves, to work up the raw material raised by them, but would deliver them, also, from the tribute hitherto paid to us. Our wool production, indeed, would not suffer thereby; our wool trade, on the other hand, would be deprived of a considerable gain, and so would, likewise, our manufactures, and more especially, those in the Austrian states, would be losers; they would be deprived of the very convenient opportunity of obtaining a great part of the required raw material, and their business would become very much limited. Accordingly, if any country presents gloomy prospects for the German wool production and wool trade, as far as the future is concerned, it is Hungary, above all. But even here, I confess, I cannot discern any great danger. Hungary, in my opinion, as to the increase and improvement of sheep breeding, if I may judge her by the past and the present, will not run in advance of the age, and scarcely be able to keep up with it, and consequently she will have to offer scarcely so much wool as the increasing demand is entitled to calculate upon as her due share.

Russia, whose government in every way endeavors and strives to extend and strengthen her colossal empire, has lately made gigantic efforts in behalf of all the branches of her productions, and also devotes particular attention to the production of wool. Russia, which, though very thinly populated, in extent equals all the rest of Europe taken together, finds it easiest, and is obliged to favor most those productions which require the smallest number of hands. Of this description, is cattle breeding—and more especially, in the breeding of sheep, an uncommonly small number of hands is requisite, one man being sufficient for several hundred head. Hence, even from this point of view, the country would have to favor the breeding of sheep, even if it were not done from considerations of national industry, which render it a duty of the government to labor for the highest possible increase of the value of such produce.

On the part of government, as well as of private persons, much has already been done in behalf of the introduction and spread of sheep, and the production of wool increases rapidly.

Although Germany is not affected thereby, directly, yet, indirectly, she is so; and the orders given by England, in Russia, for wool, have already illustrated this practically. It is a question of deep interest to us, therefore, what will be the probable development in Russia. We might feel secure, in the contemplation of the fact to which I alluded above, viz: that some of the Russian manufacturers, at present, buy the most excellent shearings from Silesia, and resting upon this, we might take no further notice of what is going on in the wool production of Russia: still, such carelessness might give rise to bad results. In order, then, not to run that risk, we had better ascertain her present circumstances, and draw our conclusions therefrom, with regard to her wool production, and derive from it some good lessons. He who has judgment, and can claim an opinion on such topics, cannot deny, that in Russia, sheep breeding is capable of being indefinitely extended, and that a great beginning towards it has been made already. Now, what will be the effect upon the wool production and the wool trade of Germany, should Russia continue the course she has commenced? We can answer this question by the same reply we gave in reference to Hungary, viz: As to *quality*, according to all appearances, she will never reach us, although, in regard to quantity, she may, hereafter, become our most powerful rival in the European wool market. The arguments which can be referred to, in support of this view, in a few words, are these:

In the first place, lands, and consequently, pastures for flocks, exist in great abundance and are of great extent in Russia, but neither their natural, industrial or economical condition is such as to render them, throughout, fit for improved sheep, or in one word, healthy pastures.

In the second place, there is, at present, a want of experienced and able sheep breeders, and so too, of capable sheep masters, under whose guidance the flocks could prosper and rapidly be developed in their improvement.

For this reason, sheep breeders will have to content themselves for a great length of time, if not forever, with a wool product, which we reckon among the lower and middling sorts, and which, in no way impedes us in our production of the finest wool.

In the third place, the demand for wool, in Russia, increases in the same ratio as the production. To this we must add, that more particularly, in the southern provinces, where the greatest activity is displayed for the improvement of sheep breeding, there occur, not rarely, unproductive years, (as, for example, in the case of unusual dearth,) which prove ruinous to the flocks, and much reduce them, and always throw them so far back, that it requires many years again for them to regain the stand they had before attained.

According to the foregoing, then, the German wool production has to dread from Russia, far less than it may have the appearance of at first sight. In like manner, also, the German wool trade will be affected in that quarter, neither particularly nor unfavorably. For but a small quantity of their fabrics will find its way to Germany, except such as come from Poland; and the wool they can spare for export, will be shipped much more conveniently to England, France and Netherlands.

After having dwelt at length upon those European countries which are competitors with Germany, both in the wool production and the wool trade, and which will continue to be so even to a greater degree for the future, we proceed now to speak of those other parts of the globe, which deserve our special attention, namely, *Polynesia and North America.*

It is now about forty years since the wool production of the English colonies of New South Wales, was mentioned for the first time by the public journals. At that time the German wool had acquired for itself a high reputation, began to be sought after and brought good prices. The English envied their German competitors who had come forward simultaneously with them upon the German wool market and with a view to comfort themselves, and to keep down the opinion of the German wool growers, they circulated the assertion, that within twenty years they could grow the entire amount of wool they required, and more especially the finer qualities, heretofore obtained from foreign countries, in their own colonies, and thus they would become independent of foreign countries. Nearly thirty years have elapsed since then, yet to this hour, the menace has not been realized. The quantity which they yearly receive from their colonies, has been enlarged considerably, yet in no larger proportion than that in which the wool consumption of England, in general, has increased, and the quantity of wool England buys from the Continent of Europe is the same as heretofore. It is a fact of no little consequence that to the present time (1845) all attempts made to raise even the smallest quantities of merino wool, have failed, although the greatest pains have been taken, to make it successful and although merino sheep have been brought over from Europe; hence the demand has to be supplied from Germany, at least at present, and not unlikely for all time to come. Even if there were no other evidence for it than that which is contained in the prices, the proof would be complete. Thus for example, the price hitherto paid in England for Polynesian wool [Australian?] has not been higher than from 9 pence to 2 shillings per pound, or from 30 to 66 thalers, equal to 21 to $46 per cwt., a price at which scarcely the lowest German middling sorts can be had in England; especially, if it be considered that they cost originally in Germany more than 50 thalers (equal to $35) per cwt.; and consequently must amount to more than 60 thalers ($42) when brought to the English market.

In regard to the Polynesian wool, it must be observed that its quality is much lowered by the pastures; these being too rich, and also by improper treatment. It should also be mentioned here, that in Polynesia the flocks sometimes greatly suffer from mortality, so much so that their growth and increase seems to be limited to certain fixed boundaries. For it is a well known fact, that sometimes entire flocks die off; a loss which is felt there so much the more, since it is not easy to buy new ones.

It has been asserted that the lands fit for sheep breeding, are of indefinite extent in Polynesia. But later reports have shown, that although there is abundance of soil, even without an owner to it, the lands that can be used for sheep breeding, are not by any means of unlimited extent. At all events so much appears to be certain, that Germany has nothing to fear for her wool production and her wool trade from Polynesia; for the present we are content with the evidence given by the fact that our wool continues to be as much sought after as formerly, when no attention whatever was paid to the Polynesian wool. In fact the function of the Polynesian wool is only this, that it serves to supply the deficiency which otherwise would arise, since the other wool growing countries, would not be able fully to keep up with the rapid increase of the consumption.

Finally we have to speak of *North America*. It might well be supposed that in a country, so much advanced, both in a political and industrial point of view, as the United States, a branch of business so exceedingly well suited to their agriculture, could not have escaped their attention. And indeed it is not so very recently, that they have commenced paying regard to it. However, nearly every where in the United States, the experiments which have been made, were attended by no very bright result. *For it has been found that the sheep, and more especially the highly improved sheep, do not last well in America, and so too that the wool grown in America by the German sheep does not at all compare with that grown in Germany.* German farmers soon knew how to explain the phenomenon by the fact, that rich and luxurious lands like the American praries are poorly qualified for sheep, especially for highly improved sheep, and they have maintained that the land would not be adapted for sheep breeding, until its too great richness is in some degree diminished by continued cultivation.

Moreover, the greatest exertions are being made in North America for establishing improved flocks, and for improving and increasing those which are already there. Now and then merino sheep are sent from Germany; but as to these it is as with all others sent abroad, viz: not the very best to be found in Germany, are sent, although the prices paid are high. Add to this the heavy losses which are inseparable from a distant travel, and whereby the cost of those brought over safely is much enhanced. If, with such risk, and with so great efforts, there is no better success in prospect than has been heretofore, and as it will continue for a great length of time, it may confidently be expected that the taste for it will decrease, and that, for the next future, enterprises of the kind will not extend very far.

What I have said here, must not be taken as merely consolatory; for it is founded in truth. To be sure also in America, as in several other countries, for example, in Hungary, Russia, and even in Polynesia, it is chiefly our countrymen, viz: the Germans, who cultivate this branch and endeavor to render themselves useful by spreading in those countries the knowledge and experience acquired in our "fatherland."

However, being nothing but mortal men, they cannot conquer impediments made by nature, and which can be overcome only by time and united efforts. For the present, I think, America will find it to be a sufficient task to make herself independent of Europe with respect to part of her demand of the raw material; but to think of soon producing so much wool, as to be able to export it, would be an idea altogether too bold to excite any thing but a smile of the Germans.

In speaking of the wool production of North America we notice for the present only the quantity, caring less for the quality. Even the common sheep thrives there in particularly favorable years, upon pastures and under circumstances as above described; while in less favorable years the number of those that perish, is enormous. No wonder, then, that this is so much the more the case with improved sheep. While they are treated with the utmost vigilance and care, as rare animals, it will do very well. But this is practicable only with a very limited stock, and is so no longer with its larger increase which brings with it all the calamities alluded to.

Without therefore, entering into further details, I may proceed to draw my conclusion which is this: *North America will require our wool for a long time, till she can meet the demand of her own woollen manufactures, which are on the increase, and flourish well; and hence, instead of exporting wool to Europe, she will have to import from Europe, for a great length of time.* We can therefore read with perfect calmness the accounts coming from America, and which assure us that the breeding of sheep makes much progress, and at no distant day, will supply not merely the domestic, but furnish even a surplus, for export.

The comparison, then, between production and consumption furnishes the following result: "*As heretofore, the production has continued so very far from surpassing the consumption that it does not even come up to it; so much so that even at this time an increase of flocks is desirable, which (as is evident) will be the case only in a still greater degree in future, since with the growth of population, the consumption of wool must increase in the same proportion.*" This shows that the future prospects of the wool business are very bright. However it must not be supposed, that extravagant prices can be calculated upon; because then, as was shown above, other kinds of materials are used, which limit the consumption of wool, and soon produce the effect of lowering its price; whereas low prices increase the consumption and insure its production.

Import of Wool into England in the year, 1842, *&c. in bales.*

	1844.	1843.	1842.
From Germany,	70,305	53,495	47,502
Spain and Portugal,	12,023	4,395	3,118
Australia,	70,908	67,160	52,897
Cape of Good Hope,	8,659	7,734	6,521
Russia,	16,984	10,771	14,180
East India,	6,741	6,594	11,876
South America,	24,565	36,129	19,956
Barbary,	9,564	1,854	1,439
Other places,	9,418	9,720	4,320
Total	229,167 bales.	189,104 bales.	161,809 bales.

XVI.—*Requisite qualities of Wool for manufacturing purposes.*

Of the superiority and varieties of German Wool.—I will commence by stating the qualities required of wool for the purposes of manufacturing.

It must be *healthy*, i. e. produced by a healthy sheep; for, if otherwise, it lacks strength, and in the violent process it has to go through, it will go to pieces. The cases, where for certain fabrics weak and feeble wool is sought after, constitute merely an exception to the rule.

Furthermore, it must be *nervous*, for it then possesses greater strength, and is more elastic, so that its hair is finer and makes the fabric to last better, which of course renders this wool highly appreciated by the manufacturers, as it ensures them their old customers, and procures them new ones.

Again, it must be *tender* and *fine*. To what degree these qualities may be requisite, depends upon the kind of manufactures for which the wool is used. For a wool which is fine in the view of one manufacturer, may not even be middling in that of another. With some manufacturers it is not exactly fineness that they desire, but they require of the common wool which they use for their fabrics, a certain pliancy and tenderness, which make it work easier and produce a better species of goods. And that is what they call fineness, it being all that is requisite for their purposes.

So too, it must *not have grown unhealthfully*. This comprises the two extremes, viz. the sickly and the luxurious growth. Both are faulty and lessen the value of the wool.

It likewise must be *neither too long nor too short*. This has often been discussed. In the history of the breeding of merino sheep we meet with several periods, where sometimes progress was made in one respect, and then a retrograde motion ensued. Originally great length was viewed as best. This was advantageous for the sheep breeder, because it gave him a heavier weight of fleece. Then the opposite extreme became predominant, and "the shorter the better" was the prevailing view. Moreover, at the same time a high degree of fineness was the grand object. The high prices paid for a wool of this kind, made up for the small weight of the fleece. Thus arose the state of scantiness of wool in many of the flocks, from which they can be rescued only by a skilful conduct.

Finally, it must be *well treated*, during the time of its growth, as well as at the washing and shearing. It is the treatment whereby the secret, for the greater part, must be explained, why the wool of Germany, and especially of some of the German states has so decided preference over that of other countries. This is so much the case, that the wool of the very same sheep which furnish in Germany an eminently fine and valuable product, on their being transplanted to other countries can scarcely be recognised and is hardly worth half its former value.

The so called "country wool," i. e. very common wool, has become quite rare in Germany, and in some parts it has disappeared altogether. It needs not to be questioned whether the breeding of sheep has been, and still is, benefitted by the complete extinction of the common country sheep. For now that Germany can furnish the wool which is called common wool, although even this is an improved quality, at the same price which formerly was paid for country wool, no man can have a doubt whether he would prefer wearing fine cloth, when he can have it at the same price as a common and coarse one. There are none but the furriers and persons fond of sheep skin fur who would raise any objection. That improved wool must have great preferences over the common, is a self-evident proposition. It not only furnishes a fabric more agreeable to the consumer, but the cloth made of it is also more durable. It is not likely then that, in consequence of the progress of improved sheep breeding in Germany, common wool should disappear entirely, nor would a result such as that be desirable. For, if it ever should come to pass, they would suffer in their own wool trade, and would have to supply their wants (as e. g. soldier cloth) from abroad, which would injure their domestic manufacturing interests.

It is now (1845) not fully ten years since long carded wool became the subject of much discussion, and was highly commended as the proper means to effect, to some extent, a restriction of the over-production of short merino wool, in case some of the wool growers should give up the latter and commence raising the former. The expectations indulged in, however, were disappointed in some measure, and it must be of interest to ascertain, how it came to be so. This will teach us at the same time, whether the production of fine carded wool has any chance of becoming a general and more profitable business.

About twelve years ago, several spinning mills for carded woollen yarn were established in Germany. They did a splendid business, they were not even able to execute all the orders they received, and sometimes they were in greatest want of the raw material, not having been supplied sufficiently with wool of the requisite length. No sooner had this become known among wool growers than the resolution was adopted, to produce wool of that length, the hope having been entertained that a rewarding price would be paid for the wool, if it be grown by merino sheep. The subject was also debated in the sessions of the Agricultural Society of Vienna, and in consequence thereof several wool growers made attempts which, indeed, turned out quite satisfactory. Still it soon met with unforeseen obstructions, some of which we may specify here:

In the first place, in the flocks with which the experiment had been made, there were many retrograding to the original blood, that is to say, they relapsed again into producing short wool, and which it became necessary constantly to remove, in order fairly to consolidate it. Thus, the number did not increase, and it was impossible to furnish the wool in as large quantities as spinners desired. The demand for it, therefore, remained very limited and the price too low.

In the second place, long wool sheep require particularly rich pastures, which, in the present state of agriculture, do not exist in Germany to an extent such as to feed large flocks. In some foreign countries, on the other hand, as in Hungary and Polynesia, they exist abundantly, so that enormous flocks can be fed; and those two countries have such vast advantage over Germany that the Germans would be unable to compete with them, but for the superior quality of their wool. This, however, cannot well be expected in the case of their carded wool, because, owing to the want of such pastures it does not possess the great length, and more especially not that laxity or slackness which in such wool is essentially requisite to make it fully adapted to the purposes for which it is used. For, in a like manner as one of the principal merits of merino wool is its flexibility, i. e. the power of contracting itself, when the wool, worked up to cloth, comes to be fulled; the opposite quality is one of the chief requisites in carded wool, because the goods made of the latter are smooth and must have no "cover," as it is called.

In the third place, the price paid for such carded wool, is not so high as fully to reward the trouble and the sacrifice it requires. Some wool growers had been of opinion that a real carded merino wool must be a highly valuable product, because they thought that, from its superior quality, the stuffs made of it would be preferred in many cases to silk. This expectation, however, has not been fully realized, principally because the anticipated perfection and beauty has never been attained. The natural flexibility of merino wool presents one of the chief impediments to changing it into a perfect carded wool. For this reason it can succeed only in those countries where the pastures and climates are such as to lessen the flexibility of the wool, as is the case with Hungary and Polynesia. From the similarity of the American pastures to those of Hungary and Polynesia, it may be assumed *a priori* that the same result will be obtained in this country.

Still although the attempts to produce carded merino wool, were not attended by a very bright success in Germany, the hope of succeeding in the end, by perseverance, is not by any means relinquished. I do not mean to say that such wool will be grown throughout Germany, but that it will become and remain a production merely of single provinces. I will mention only two in which it already exists on an extensive scale, viz., Bohemia and Mecklenburgh. In the mountainous portion of Bohemia are very large pastures similar to those in Hungary, and improved sheep are found there, whose wool, by the average of entire flocks, after one year's growth measures a length of from two and a half to three inches, and which, accordingly, answers well for the comb, particularly because its curves are flat, which puts the right limits to its flexibility. Many of the owners of such flocks hardly know what a wool they produce; they let the thing go its own course, and are well satisfied with the regular and ready customers they find. By devoting full attention to the subject, they undoubtingly could arrive at a higher degree of perfection and would increase their income; for, the wool produced would be better fit for use and would be more valuable, and then again the quantity produced would be larger, inasmuch as the product would have greater length.

At present the carded wool in the wool trade of Germany plays too much of a secondary part. In Bohemia it is not distinguished and separated from the other sorts, until it is stored up in the warehouses of the wool dealers, before being sold to the customers. In Mecklenburgh it heretofore was exclusively in the hands of some few wool-dealers, who, assuredly must have made a profitable business of it. Should this wool be produced on a larger scale, and be introduced into the wholesale traffic, so that more persons become engaged in it and will be in search of it than at present, its price would soon increase, and wool growers bestow upon it greater care and attention, which, no doubt, must have the effect of securing a rapid progress in its production, both as to quantity and quality. By its production, the field of wool growing is much enlarged in Germany, and a wider territory opened for the wool trade, both of which must serve to improve the future prospects of one as well as the other.

XVII.—*On Agricultural Schools*

The most celebrated agricultural schools of Germany are those of Hohenhiem in Wurtemberg, of Schleisshiem in Bavaria, of Tharandt in Saxony, of Giesberg near Wiesbaden in Nassau, and of Moegelin in Prussia.

It was one of the principal objects of my voyage to visit some of these schools; and being at Berlin, so near to Moegelin, (about thirty English miles) I set out to visit the resting place of father Thäer (as he is called among the husbandmen of Germany) and his school, where many an eminent agriculturist has been educated. Partly by rail road, and partly by stage, I reached Moegelin, which lies a short distance from the public way. As we approached it, the horses could scarcely pull the vehicle through the sand; and I could not well conceive how it was, that Thäer had chosen such a sterile region, too poor for the growth of pine, for an experimental farm.

Von Thäer, the son of the celebrated agriculturist, was absent; but one of the professors received me very kindly, and offered me a room in the building where the pupils lodge, which I had to accept as there was no other lodging-house on the place.

I found the pupils busily engaged in packing up, as the time of vacation had commenced, and several had already gone. I dined with them, at the family table of Von Thäer, and rambled with some of them through the fields, farm yard, and its extensive buildings.

The number of pupils this year was twenty, and never exceeds that number; they were all grown, and sons of rich gentlemen. The next day Von Thäer returned. I found in him a well informed, exceedingly obliging and polite gentleman. I passed with him many hours, in conversation upon various subjects of agriculture, especially on breeding merinos; and he presented me with several specimens of his best wool; laid before me the pedigrees of his merino flocks; at the office, he explained to me his mode of keeping books by double entry, whereby every branch has its debit and credit, kept in perfect order and great accuracy, and continually open to the inspection of the pupils. He allowed me to take sketches of some of his best rams and ewes, which I did with great care, in order to give a true representation of the form of that breed, as it is just now thought the most advantageous. I say just now, because there is in this, like as in every thing else, a little of humbug among sheep-breeders of this part of Germany. During the time I was occupied in drawing, his upper shepherd, (schafmeister,) gave me many details of the management of their flocks. I visited the artificial meadows, which are irrigated from a pond not far from the estate; collected on that matter all the information I could, which I give under different chapters, in order to avoid repetition and bring every thing within the space of a few pages.

Thäer selected this barren tract to show what knowledge, perseverance and a well regulated system can effect. Moegelin lies on an extensive sandy plain, the soil producing only through rich manuring and judicious rotation of crops. The sheep are fed upon artificial pastures, which in dry seasons yield scarcely food enough. Potatoes are raised in great quantity, which are fed to sheep and cattle during the winter. A great many of them are likewise distilled. Throughout the north of Germany potatoes form the principal fallow crop, and are used for whiskey, the slop of which is given to cows and sheep. This is a decidedly unnatural food for the latter; but in these districts, where land is poor and scarce, they are obliged to manage in some forced way to keep their sheep through the winter. It is not very advantageous for the wool; and when it is given in too great quantities, it injures the growth and quality of the fleece. Thäer has, as a matter of course, good implements, threshing machines, &c.; fine cattle, and a choice flock of merino sheep. Around him is nothing for show, but every thing for use and profit. The buildings have the same character, and are not remarkable for their beauty, but strong and well arranged.

The institute stands apart from the other buildings, and contains, besides the rooms for the pupils, the lecture room, a collection of models of agricultural implements, (among which I observed a good many Russian ploughs,) a philosophical apparatus, a laboratory, a herbarium, &c.

The celebrated Albrecht Daniel Thäer, the father of the present proprietor, was born in 1752, at Celle, in Hanover. His father was a physician. At the University of Goettingen he finished his medical studies, and afterwards practised medicine in his native place. In 1786, he married the daughter of a nobleman, one Miss Von Wellich. The garden attached to his house, where he amused himself with cultivating flowers, gave rise to his agricultural celebrity; the taste for the culture of flowers led him gradually to that of agriculture; he bought a larger lot of sixteen acres, and executed on it his plans. It was soon the attraction of every body, for the collection of rare plants and beautiful walks, fine orchards, and the different kinds of clover and grass. His success in the culture of various plants, stimulated him to buy a more extensive tract of land. About that time, just when he was at the point of giving up his profession and devoting his time to agriculture alone, he received from London his patent, as physician to his majesty George the Third. This honor came unexpectedly, and he could not withdraw himself at once from his profession, but began by degrees to resign his practice, and continued his favorite occupation, the improvement of agriculture, with the view of establishing an experimental farm. He paid great attention to the culture of herbage fodder, root crops, and especially potatoes; which latter root he most vehemently defended against its numerous adversaries and assailants. His work on English husbandry appeared soon after, and was well received in Germany and in England. His fame as an agriculturist who applied science to practice, spread over all Europe. His plan of establishing a school was at last executed, and attracted many visiters of distinction. The king of Prussia was exceedingly anxious to have Thäer's services, invited him to reside within his kingdom, and granted him the following advantages: 1. Nomination as a member of the Academy of Sciences; 2. A grant of four hundred acres of land; 3. The privilege of selling the land, and all the privileges attached to a landed estate belonging to a nobleman, in case he should buy another estate; 4. Protection to his academy; 5. Entire liberty of the press in regard to his Agricultural Journal; 6. Permission to practice his profession as a physician; 7. His nomination as privy counsellor.

These privileges and honors were too tempting He accepted the king's offer, and left Celle for Berlin; took possession of the 400 acres; sold it immediately, and bought the present landed estates Moegelin, and obtained all the privileges of a nobleman.

It was in June, 1804, that he took possession of Moegelin. The loss of his flocks by rot and the French wars, were great calamities, especially in the commencement of his operations; but he conquered all difficulties by perseverance; and in 1806 the academy was opened. Twenty pupils inscribed their names immediately; the number increased with every year. He distinguished himself in the improvement of wool; his flocks were superior to any in Prussia. His written works increased his fame, and the sovereigns of Russia, Prussia and many others sent him their orders of knighthood. He purchased additional property for his younger son Albrecht, the present proprietor of Moegelin, who was entirely devoted to agricultural pursuits. In the year 1828, he had a severe attack of rheumatism, and his health began to decline; in 1827, his eye-sight failed entirely. His sufferings were great, but he bore them with fortitude and resignation, and at last, on the 28th of October, 1828, death put an end to his pains.

Thäer was the first who arranged the existing facts and theory of agriculture in a proper system. His works are highly valued among all agriculturists, and referred to as a magazine of solid truths.

The Germans paid due homage to this great man while living, and have not overlooked, as to posthumous honors, him who had rendered such great services to his country and to mankind in general. His statue stands among those of all the great men of Germany.

Thäer is buried in his garden, opposite the family dwelling, on the shore of a small clear pond, among the trees which he planted himself, "his children," as he called them. His tomb is under the eves of a chapel. No cold, huge block of marble tells you that here lies father Thäer; but above his grave rises a pyramid of flowers which with their fragrance arrest the attention of visiters, and point with their rich colored petals to the grave, where the man lies who loved them, and who spent his life among them, watching their mysterious habits, to catch a glimpse of the Great Mother's secret operations. Over his grave the ornaments of nature's rich temple mourn for their departed friend. His consort lies by his side surrounded by shrubs and trees.

Von Thäer's Agricultural School.—Thäer says, in the programme of his agricultural school, that the object of his institution is to educate capable superintendents, or directors for large estates: but that *he* cannot call any one a capable director, who has only the skill to carry out a mode of farming in an imitation or borrowed manner: that he understands by a capable director, a man who can, with a clear discernment, enhance the value of a landed estate entrusted to him so far as circumstances of condition and situation allow it.

A capable director will propose the object to be attained and which may be profitable, prudently, circumspectly, with an exact regard to all the internal and outward relations; and then, prepared with practised eye and tact, rise from one step to another, firm and sure, to the proposed height of culture and productiveness.

That in such a course of operations, every visionary scheme and every restless change from one thing to another is to be avoided, is self-evident.

But if we now enquire further, as to the material and elements which are considered necessary to educate any one to such a capacity, it is needful *first*—that the agriculturist should understand the general rudiments of all industrial intercourse and those also which belong to the general economy of the state; and these so much the more, as he will always be dependent upon the same. He is obliged, therefore, to fit himself to discern how his own landed estate is related to the whole country; how its politico-social relations and the conjectures of trade may check or aid, operate favorably or disastrously upon his enterprises and their results. Hence he can easily learn to judge, also, how the particular situation of a farm, the nearness or distance of the market, the thoroughfares of trade, the exchange of manufactures, and the present value of money represented by the rate of interest, and, also, by that of the productiveness of mercantile or industrial capital, may impart a greater or less value to his landed property. These will, therefore, be particularly considered, in the exposition of the general doctrine of trade, which treats of the value of capital, the price of products, and the cost of labor.

While thus the agriculturist is led, as it were, from without to the internal economy of landed property, he must further be so prepared, that he can judge not only of the soil on the same, and the materials contained in it, but also the given degree of richness, and the fit culture. It cannot also escape him, what influences the circumstances of the region exert on vegetable and animal development; and still less ought he to be unacquainted with the physical and moral circumstances of the inhabitants of a country under his inspection and examination.

If we imagine, finally, the agriculturist as in the conduct and management of the farm himself, then we wish him furnished, not only with knowledge but also with ability. He must not only be mentally educated, to conceive an idea, but also be practically certain and skilled in executing it. So, that the thought may be reduced to reality, he must be possessed of a rapid, sharp, sure perception and skill, and with an extensive knowledge of the particular business, instruments, and modes of operation, in the practice of his profession. The agriculturist must, as much as is possible, unite in his own person, the knowledge of art and the manual skill of his branch of business. The more this is the case—the clearer view he can obtain over the whole of the farming operations—so much deeper insight will he have into the particular parts of the same, into the relation which they bear to each other, the agencies subordinate to himself, and the instruments of the whole system.

To look through this system correctly and regulate it, the agriculturist needs only the aid of a properly arranged and carefully executed mode of keeping accounts: for as, according to the expression of Thäer the elder, "Account-keeping is the A B C of every trade," so it is wholly and especially the alphabet of agricultural enterprise. Through it, only, the results obtained have a certainty, the relation of the various branches to the whole are represented by numbers; the cause and effect, the means and result, the deficiency and the surplus, are reduced to figures and expressed in money-value.

As the agriculturist is, and continues in an always progressive intercourse with nature and its life; so those scenes are of aid to him, which give him an insight into the powers of nature, its influence on the success or failure of agricultural enterprise, the facility of developing these powers and influences of nature so as to regulate them according to his own wishes as far as it can be done. Hence, it follows, that the knowledge drawn from the domain of the natural sciences ought not to be wanting, in the complete education of the future director: [steward, or manager, or overseer, as we call him in this country.] As it has been shown how the material and elements must act together, to educate a thorough and an able agriculturist it seems to us, also, that we have, at the same time, shown that while we have in view, as the immediate object of our school, this forming of thorough farmers, we must not limit the object within a narrow space; but make the training which accomplishes the general purpose, such as will enable a young man of a good preliminary education, sound parts and due application, to search still farther and acquire a high degree of information in this trade and science, by books and words.

Preparatory Education of Young Pupils.—It is necessary to mention what are considered the elementary parts of intellectual education, and what previous knowledge is demanded and must be possessed by the pupils of the institution. As to all this, an agricultural academy is in an entirely different relation to its pupils, and must require wholly different things from those which the university exacts of its students.

The university instructor has to explain the subject of all the branches, and to give to his auditors a theoretic, scientific education, with a knowledge of the nature and objects of their future profession; but he cannot exhibit to them a living view and a very presence of the trade and modes of operation of their future profession and office, proceeding from practical business. The special, practical education must be left for later years of life; and the preparations consist chiefly in isolated directions, hints and illustrations.

But university instructors can, besides, do this without apprehension; for they know that their hearers do not at once, on leaving their lectures, enter into the full practice of future, active life, but in most cases, they are yet to be prepared, by various introductory steps, and by practical experience. (The physician makes, especially in the last years of his studies, an exception from what we have just said.) An entirely opposite relation exists in the case of an instructor of the agricultural academy. His pupils in quitting him, ordinarily, do not pass through subordinate preparatory situations in their practical business; but, for the most part, enter independently, upon the full execution of their skill.

Now, although no where in a so high degree as in agriculture a sound theory springs from practice, and is strengthened by it; and although no where action and thought, life and knowledge, are so vigorously combined together as in agriculture, yet the purpose of agricultural institutions is not to teach those for the first time, who were not before farmers, otherwise their scholars would be apprentices, not students, and their circle of operations would be entirely different from those which are now designed. The purpose of agricultural academies is much more properly to develope those who are already farmers, and to form them to a clear comprehension and scientific view of what they have before learned in a practical manner. Accordingly, we must not imagine the agricultural academy to impart to its pupils the first elementary knowledge and idea of their future profession; but we may require of the academical teacher of land culture, that he impart to the experience and views of his hearers, the greatest possible amount of his own experience and observation; and that he besides, possess the fidelity of instructing his scholars, and, by sound criticism, rendering it available to them, in the observations and experiments made by others, in various situations and circumstances. But this can then only be fully attained, when his hearers have treasured up in memory, an observation or experiment, as the standard of comparison to the given one; or at least be able to educe it from the nearest sources, for the education of the understanding.

Whoever, accordingly, thinks of appropriating to himself the full education which this institution may give, it is expected of him, besides the general intellectual education which shall place him in a situation to comprehend and prepare with ease, a scientific discourse, to have a correct view of and acquaintance with practical trade and its peculiarities, as it may be acquired in a personal attendance of one, or at least two years; and of course, if the young pupil already possesses this, so much the better. We have practically found, among the inmates of our establishment, that only a very thorough previous intellectual education can, with the aid of much facility and application, compensate this want of preceding practical knowledge. But if a person little skilled in practical business, be placed in the institution with the view of his becoming, by a residence of a simple year, a perfect and thorough agriculturist, who may independently and with certainty understand how to carry on a farm; then this is more (as we have said) than agricultural institutions can or will generally undertake.

But it is believed, that the institution may undertake to impart to such a person, unskilled in practice, a general view of the whole domain of land culture and its various branches, as well as many particular kinds of knowledge; and the academy may be resorted to often, and not without good results, by men who are either in possession of large landed estates, or expect to be so, and who in the earlier period of their life, are strangers to agriculture, and enter it in order to acquire so much information and judgment that they may understand, in general, how to discriminate what course to adopt in the management of their property, and what demands they have on their stewards.

In the same way, amateurs of land culture, induced thorough necessity, have frequently acquired a lively interest and fondness for this branch of human industry, and have gained by later observation and exercise, practical skill and experience; thus descending to agriculture, as if from above, in an inverse order—from theory to practice, from knowledge to ability. Yet this method is more difficult and uncertain; and only practicable for such, as have time and means at command.

Means of Education at the Institution.—It has been already noticed, that no where so much as with the agriculturist, knowledge and ability, theoretic acquaintance and practical skill, insight and circumspection, must be connected with each other and mutually co-operate. Hence it is to be desired that practical information be already possessed by the scholars; as the elements of practice, in addition to those of science, are considered to be indispensably necessary, when you aim at the complete education of the agriculturist.

In this point of view, it has been already established by the form and conditions of Thäer's institution, that it should be very limited in its compass: for only with a small number of pupils (it seldom exceeds twenty) can there be an intercourse so various and general between teachers and pupils, as is here the case, where every teacher who lectures can, and willingly does, give explanations in what is not understood or remains obscure in his lectures. Besides, here prevails the particular regulation, that all pupils of the academy take their meals with the director—a practice by means of which, intimacy and freedom of communication are formed. It gives rise to agricultural discourse, to questions and communications in addition to the lectures of the teachers.

The cultivation of the soil, in a more confined sense, the director of the institution himself teaches, who is also the proprietor of Moegelin and three other estates, lying at a distance of from one to four miles apart. Whatever the scholars of the academy have heard in his lectures, they see carried out, in his farm, within the limits which the circumstances of time, and the situation of the farm admits; and, wherever the connexion between theory and practice, doctrine and life, remains obscure or not understood, then the daily intercourse with him gives them opportunity to acquaint themselves as well concerning particular scientific processes, as also respecting the whole system of economy, by the explanation and elucidation, not only of the director himself, but also of the other officers.

Besides, Moegelin itself, and its agricultural as well as other kinds of intercourse, offer likewise many auxiliary elements, which general and agricultural education at academies requires.

Among these we may reckon the vicinity of the landed estates of the Baron Von Eckhardstein, of Counsellor Koppe, and other excellent farms, which furnish to the young agriculturist interesting examples of what intelligent industry, joined to capacity and energy of will, can effect in agriculture. Besides the objects of special culture of land, the above mentioned estates offer also many things worth observing, for the technical occupations of the farmer. Among these are many distilleries, partly conducted by steam engines, and partly in other ways, and great manufactories of beet sugar. The whole of the valley of the Ober, is very interesting and instructive, on account of the peculiar formation of its view of hills, its various states of soil, and the modes of economy which it offers, and its enlightened and skilful body of farmers.

In a technical bearing, too, the limestone mountains of Ruedersdorf, the different manufactories of Neustadt Eberwaldt, and other places, furnish interesting points for the young agriculturists.

In order to render accessible and auxiliary the above described elements existing in the surrounding country, for the education of students here, various excursions are undertaken with them by the teachers of the institution, on suitable occasions, and, as circumstances will allow, some or all of the pupils may accompany the director on his tours of inspection to his other estates. (See further respecting these excursions hereafter.) In this manner agricultural life and industry will be so nearly reached, by the young people, that if only a desire and inclination, in some measure corresponding exist on their part, their knowledge will certainly be nourished and elevated. But if many should fall away from the above mentioned auxiliary and educational influences, and others be much weakened, then it would be no longer possible to execute the proposed plan, in the short period of a year, during which a course may now be completed in this institution. It would then be necessary to enlarge considerably the compass of this establishment, and also the number of the pupils. For in the same degree in which this happens, must the personal intercourse between teachers and scholars be abridged, and especially must the rule be relinquished, according to which the present pupils are received at the table of the director and into his family. This last regulation has a great moral effect upon the pupils. While the academy, indeed, is under the influence of the family, the natural roughness of the student will be counteracted, and, in this way, ties of confidence and attachment are not unfrequently formed, which render it possible for the director to assume more the place of a fatherly friend than a superior, at least to those who are proper objects for such treatment. To this relation and the influences resulting therefrom, it is believed it must be attributed that it is possible, as has hitherto been very easy, to maintain the discipline of our establishment, without any punishment beyond that of dismission.

As a pleasant circumstance, not wholly unimportant to the intellectual life of the establishment, its nearness to Berlin deserves mention. This central point of intellectual and scientific education lies only twenty English miles from here, and the intercourse with it is rendered much easier by a public road passing near, and a daily post for Moegelin.

Among the different branches of agricultural industry, there are two carried on with peculiar fondness and interest. One of them is agricultural book-keeping, which is practised at all the estates of the director, according to the double entry (so called Italian) mode of book-keeping.

The principal books of the different years, which represent, in figures, the cost, receipts, and the progress of cultivation of the estates under management, are not only exposed to the voluntary inspection and instruction of the pupils of the academy, with the system pursued in the same, as explained by the lectures of the director on this subject; but they are also placed under the management and execution of those who are desirous of further information; and many yearly summaries of those estates are prepared by students of the academy, to which naturally must be added the notes and journals collected by the officers.

In this manner opportunity is afforded to the young people to learn, by their own inspection, how business is carried on, in the estates embraced in the accounts; in what way their resources may be put into action by the employment of industrial capital: what products of the soil, active capital, and intelligence supply; and in what relation every individual factor stands to the sum of the product. This view established by book-keeping, in every farm, must be so much the more instructive for the pupils of Moegelin, as it varies through the difference of the estates under management. For if, in Moegelin itself, there is an example of an estate which has been so changed and transformed by old and long continued cultivation, that only a very practised and keen sight could discern the original condition, there are, in the other estates, examples of the cultivation, according as they have been tilled a longer or shorter time than Moegelin. But certainly nothing gives so deep an insight into the business of farming, nothing so clear a conviction of the connection of the principal branches with each other, and with the whole, as a thorough mode of book-keeping. And if, therefore, fondness and skill for such practice can be imparted to the young agriculturist, there is certainly an essential requisite obtained for future success. Thus he is preserved from the frequent error of considering the several branches of the business of farming profitable and sufficient in their present state, because they once or twice a year yield large sums, without reckoning the outlay of money and labor which they often cost, and which are liable to be unnoticed. The agriculturist has in his hand, in book-keeping, an unfailing touchstone, by which he knows to a certainty what and how great are the profits or loss of particular branches of his farm, and to correct or improve all his operations.

Another branch of agriculture, which is prosecuted with peculiar fondness and success, and taught at Moegelin, is the breeding of sheep. Regard to his own interest, as well as a special predilection, causes the director to give a particular attention and notice to this branch of his farm; and as his practical efforts have been attended with successful results, it cannot but be that his teachings on this subject will have for his scholars a special interest.

The interest for sheep raising which may have existed in the students of the academy of Moegelin, will be nourished by the inspection of the already renowned flock there; and opportunity will thus be afforded for a closer observation and examination of the subject. As such opportunities, we consider the estimation twice or thrice every year of the separate animals in the main sheep fold, and the monthly valuation of their fleeces for shearing; the estimating of the rams selected for sale; and indeed the sale itself, which brings many connoiseurs and those having a fondness for sheep raising to Moegelin. These often have been scholars of Moegelin, and have there acquired their knowledge and love for sheep breeding, as an important branch of agriculture, which they have practised with skill and success.

We may likewise here mention the extensive potato culture carried on with particular care at Moegelin, and the estates belonging to it; and further, the modes of irrigation, cutting of peat, making of bricks, &c., which are either found on the principal or neighboring estates.

All the above mentioned elements provided by the internal and outward circumstances of Moegelin, will be regarded, and the pupils in their agricultural education be taught, in the special lecture, and other modes of instruction established by the institution, their uses, where a particular method of teaching prevails. We now come, therefore, to

Lectures, Excursions, and hours devoted to Conversation.—The whole series of lectures is divided into a winter and a summer course—the end of the first, or the beginning of the last, not being fixed by any particular period.

The director of the institution, during the winter, gives lectures as to the business of agriculture in relation to profit, and adds remarks on agricultural education and intelligence, capital, the price of products and of labor, the nature and idea of landed estate, and all that belongs to it, with its superintendence and book-keeping. Besides, he teaches stock breeding in general, but more especially that of merino sheep and the growing of wool. From these, at the end of the winter, he passes over to the theory of tillage; gives under this head a survey of all the experiments made in this matter by lectures concerning the quality of the soil, its exhaustion, and restoration; the vegetable, animal, and mineral manures; the theory of tillage, ("doctrine, how far the activity of the soil may be excited and proportioned";) on ploughing, instruments of tillage and their use—wherein is included the execution of the particular parts of field culture, culture of meadows and plants, and acquaintance as far as possible with all the methods of manipulation and observation to be found therein.

In direct bearing herewith stands—

1. The lectures of *Dr. Trommer*, as to the rudiments of mathematics, chemistry, and physical philosophy, with respect to their employment in agricultural industry; and hence especially agricultural chemistry, illustrated by experiments required for the clear insight of the same; with constant regard to the use of these sciences in agriculture, and the business therewith connected, such as breweries and distilleries, sugar and syrup boiling from beets and potatoes, &c., as well as brick making and the like, which are particular objects of a technical summer course. Besides, to the auditor is given the opportunity of performing simple chemical analyses, under superintendence. Finally, he teaches, in close connexion with the foregoing, the physiology of plants and systematic botany, the outline of which the educated agriculturist who wishes to penetrate deeper into the science cannot be without, if he would reach a clearer insight into vegetation, so as to be able to understand and take true pleasure in his occupations.

2. The professor of the veterinary art, *Dr. Kuers,* teaches the knowledge of healing animals, divided into anatomy and physiology illustrated by preparations and practice in the dissection of carcases; dietetics of the healthy and diseased animal; the *materia medica;* general pathology and therapeu-

tics, as well as surgery, as far as time permits and the knowledge of them is necessary to the educated agriculturist.

Of the excursions, those which are under the conduct of the director of the academy have excellent farms and the survey of them for their object; while Dr. Trommer, with [illegible] class, visits the iron works at Neustadt Eberwalde, the brick kilns of Joachimthal, the beer brewery of Gruenthal, the limestone mountains of Ruedersdorf, and other points celebrated in a technical respect.

To the lectures on botany and physiology of plants are added, naturally, botanical excursions, of greater or less extent, under direction of the same gentleman.

In the hours for conversation (as they are named) the students of the institution regularly assemble, twice a week at the director's; and these gatherings have for their object to give the young people, on the one hand, particular aid and opportunity to acquaint themselves, by explanation and instruction, with the difficult points of the profession, or whatever remains obscure in the lectures; and on the other, to come into intercourse with their fellow students in debates and statements concerning the objects of agriculture, and thus promote discussions among them, which, when they are directed and regulated, operate not only instructively, but also engagingly and encouragingly. Of the same conversational character are the rehearsals established by Dr. Trommer, on the lectures delivered by him on natural sciences.

Constitution and direction of the Academy.—The special direction is managed by the counsellor of agriculture, *Von Thäer*. To him every one must apply at matriculation, and in all that relates to a residence in this institution.

The students dwell in the academy buildings, particularly devoted to the purposes of instruction. These are separated, but not far from the farm buildings. The edifice, besides the chambers of the students, contains the lecture hall and the assembly rooms. The rooms of the pupils are all alike, and only differ in situation, and are furnished in the same manner, with only the most necessary and simple furniture.

The farm stands in no direct relation to the academy; and the students are in no way entitled nor compelled to engage in the management of the same. But, in order to render it easy, by observation and survey of the operations and regulations adopted in the same, to extend their agricultural knowledge, the first officer on the farm (at present Herr Grüttner) is authorized, by request, to impart information on all the operations of the farm; and an account will likewise daily be given by him, in the auditory, of the principal works undertaken. These are the easier understood as every pupil has a chart of Moegelin.

Further, the inspector of the farm gives to those who wish it, practical instruction in book-keeping by double entry; which, as we have already mentioned, is carried out in Moegelin and all the estates belonging thereto. The secretary of the director also keeps the pedigrees of the present sheepfold. Inspection of these, likewise, will readily be afforded, and the necessary explanations therein imparted by this officer.

The opportunity to learn the practical business of the distillery will be granted to those who have a desire for it, by the superintendent of the distillery.

The library, botanical garden, and collection of natural history, stand open to the use of the students, under certain conditions.

Those only, who in their studies pass through a special course, will be considered as really members of the academy, and may afterwards regard themselves as the scholars of Moegelin.

Other men, desirous of knowledge, who wish to take up their resideuce here for a short time, will be received, if there is room in the buildings designed for instruction ; but they are looked upon only as visiters, and in no way is granted to them the privilege of ranking as tne scholars of the Moegelin academy.

As has already been noticed, the number of students here is limited to only a small one. They are all boarders in Thäer's house, so that this institution, in a rare and peculiar manner, forms one family. On account of this close relation a single individual can cause disturbance and discord. Therefore the right is strictly retained of sending away, at once, from the institution, a student as soon as elements show themselves in him, or events occur, which, by exciting an injurious influence of his fellow students, render his longer stay neither possible nor expedient. To such a strong measure, the director is obliged to resort, also, at once, if any one, by word or deed, sets himself in hostility to the objects of pursuit at our establishment.

The Terms.—For instruction, furnished room, service, dinner and supper, yearly, 350 Prussian thalers, equal to $245 or $250 are paid.

To disseminate knowledge, as to the best mode of cultivating the soil, has occupied eminent men in ancient times; and in this period of progress, agriculture has obtained its due share of attention. Germany, so distinguished for its institutions of learning, had, at an early date, professorships of agriculture, at its different universities. Its monarchs encouraged agricultural societies, and established regular school-systems, with a view to instruct the masses in the common elementary branches of education; in order that they might be able to read the works on various branches of agriculture.

As sciences gradually developed, chemistry directed its researches to a more important object than making gold. A varied analysis lifted the veil of nature's secret operations; the composition of soil and plants became known; and the relations between both, as to their constituent parts, gave rise to many an important discovery. The influence of mineral and animal manure was explained, and many means discovered to fertilize the soil and insure rich crops. The pursuit of the agriculturist was at once elevated to an occupation requiring intimate knowledge of the sciences.

Although the helps gained by the aid of science were highly advantageous, yet the general results of the whole farming operations were not such as to secure the most important object of farming, namely to increase the profits. Every discovery in chemistry, every new theory, was believed to furnish the grand *arcanum* for raising crops without manure and without labor; when the practical farmer saw himself, at the end of the year, not much better off for the new experiment, the mania for science generally abated, and book-farming was looked upon as of no great use.

But the attention of enlightened and learned men was directed towards the remedy. They soon found that the evil was in the ill-contrived parts which work the complicated machinery of a farm. They soon discovered that the gain of one part was consumed by the other, and that the final result was loss of power, loss "of profit."

They collected facts, from different sources; compared them with each other; and laid down a series of rules which should serve as a basis on which to calculate the most probable results, as well as farming operations would permit. They reduced the most important branch of agriculture, the *economy of farming* to a system; which system enables the farmer to devise plans for the management of farms, to select the best rotations, calculate the amount of labor, and produce that most important result, "*the most lasting and highest profit.*"

It was the practical knowledge which had been wanting, to enable the farmer to construct an effective machine, which increased its speed in proportion as the oil of science was added. Thus it was proved that neither science nor the thorough understanding of any single branch in agriculture (as breeding cattle or raising a fine crop) was enough to insure the ultimate object in view. For this, was required the knowledge of every branch, separately as well as collectively, the knowledge of calculating and securing combined results; how to estimate the cost of manure, and how to employ it to the highest advantage; to calculate the amount of cattle, the food and litter necessary to produce the required quantity of manure for the rotation adopted; and a number of like practical questions, which must be well understood by all those who wish to till the land with profit. A completer science showed that farming was more intricate than at first supposed; that it requires a regular study, like all other pursuits, and this led to the idea of establishing proper agricultural schools, wherein all the sciences which bear upon agriculture, and all the practical branches separately and in connection with others: in a word, *the economy of farming* should be taught. The monarchs furnished estates and means; and in a few years several agricultural schools were in operation.

The young men coming from such institutions were employed as professors for other schools, as directors for large estates; or they superintended their own property. They proved, practically, the advantages of such an education. Numbers of educated agriculturists impressed with the importance of a higher knowledge in the pursuit of farming operations, were anxious to assist in the promotion of the general welfare; they desired to diffuse knowledge among their fellow farmers, and proposed meetings, like those of other scientific associations, where agriculturists from all parts of Germany might congregate, to deliberate upon important questions, state the mode pursued in different parts of Germany, and to devise plans for disseminating among the mass practical and theoretical skill, in that branch of human knowledge upon the results of which the welfare of nations so much depends.

The first such meeting was held at Dresden, in the year 1837. Princes, noblemen, men of science, the scientific as well as the plain farmer, assembled. The barrier of rank was thrown down; man met man; each spoke unrestrained, and debated the various questions proposed. The practical farmer found, in the nobleman, not only the scientific farmer, but one who supported his arguments with practical facts and numbers, and who took great interest in that pursuit, which was in former times, considered the exclusive occupation of the lower classes of society. This gave confidence to the farmer; he saw himself respected and considered; and he became impressed with the importance of a proper education for his business.

The next meeting which was held at Carlsruhe in Baden, saw the number of members doubled—two hundred and eighty-nine in attendance. Since that time the meetings are regularly held. Last year the assembly—the "Agricultural Convention" we should call it—was at Breslau, (I was present and of which I have given a full account) when the number of mem bers amounted to nearly one thousand. In these meetings great attention was given to the subject of education. It was proposed, and discussed by a number of the members, to teach small children, in the public school of the country, besides the common branches of elementary education, the different manner of operation in horticulture and agriculture. For that purpose, it was considered necessary to give to each school house at least an acre of land, planted partly with fruit trees, and partly with leguminous and other agricultural plants; to show them the best mode of cultivating garden plants, and how to use the hoe and other implements; to instruct them in the best mode of budding and grafting, so that they might, in the idle hours out of school, improve their orchards and garden plants; and, when more advanced in age, to explain and show them the different kinds of soil and their various properties, without entering into any scientific demonstrations; also, the different kinds of manure; the mode of collecting and preserving it; and in their lessons of arithmetic, to let them work out problems on some established fact relating to agriculture, that such problems might become impressed upon the plastic minds of the young. In their lessons of geography, it was advised to give them descriptions of the agricultural products and management of the farms in other countries; in teaching them to write to let them copy subjects relating to agriculture, without overlooking those beautiful moral aphorisms so consoling in the hardships of life. This plan is already adopted, in some parts of Germany. There was no difficulty in obtaining the necessary ground for such schools; the great obstacle was to find teachers who were *able* to carry out this new mode of training which requires men of knowledge and discrimination, to give just what is needed, and no more.

It was found necessary, in institutions in which the teachers of public schools are educated, to make agriculture one of the regular branches of study, and to oblige the clergy to attend lectures on that all-important subject, in order that these pastors might be able to give advice, and encourage the farmer in this great undertaking, where it requires the co-operation of all the proprietors, as for instance in irrigation. The numerous agricultural societies are indefatigable in their exertions to furnish to such schools and similar institutions, seeds, books, implements, &c. Besides this the government does not lose sight of the improvement of horses and cattle; it furnishes blooded stallions, which are sent, in every season, regularly to certain stations of the country, for the gratuitous use of those who are engaged in breeding horses; bulls, rams, swine of the best breed, are raised on some public estate, and the offspring sold at low rates, or given at cost to the farmers, to introduce the breed.

A great many agricultural journals, periodicals, annuals and books, are published; every village keeps at least one weekly journal of that kind. The farmers, where they assemble on affairs of their village, thus read these journals, talk upon these subjects, and give their experience.

Besides this, there are, every year, in the various German states *volkfesta* (national festivals) when there is an exhibition of all sorts of agricultural products and domestic animals, machinery, plough matches, and horse races. Fire—hail—and cattle insurance offices are founded. All these things cannot fail to produce great and beneficial results; and in many parts of Germany they are already perceptible.

The king of Wurtemberg, a true father to his country, has thus employed every possible means to promote the interest of the farmer; and the fruits of his wise measures are visible in every part of his kingdom. The three-field system is improved and rich crops of clover spread over the fallow-fields; a superior kind of live stock enlivens the neat farm-yard; the roads are lined with fruit trees; every where progress is evident.

The small Duchy Nassau may be a pattern to any government in its system of schools for the education of the mass. Where is there a country that can boast such a thorough and efficient system for promoting agriculture? It began at the root, at the very point where all should begin, with the children of farmers, who left to themselves follow invariably the methods of their forefathers.

To effect first a change of the system, it was begun by the education of school teachers, viz:

1. The pupils of the institution for school teachers obtain theoretical instruction in natural history and agriculture. Practical instruction is also given them in horticulture and planting of hops and trees.

2. The school-master is himself a practical working superintendent of the garden attached to the school, and of the nursery of fruit trees belonging in common to the villages; he gives practical instruction in the culture of fruit trees, and to the girls, in the culture of vegetables and flowers.

3. In every village is a particular school, where the girls obtain instruction in spinning, knitting, sewing, mending cloth and linen; and in many places the boys are taught in different works in wood, straw, and willow-braiding.

4. Teachers or school mistresses, who distinguish themselves in imparting knowledge of industrial branches, obtain presents from the treasuries of the agricultural societies, which consist of books, tools and medals.

5. The girls who spin the best thread, obtain prizes, being generally handsome spinning-wheels; the boys are also entitled to prizes for various objects.

6. Those boys who have distinguished themselves are sent, at the age of sixteen or twenty years, for two winter courses, to the agricultural school; from two to three hundred have already been educated in that way.

7. For twenty-one years has existed, in Nassau, a weekly agricultural journal, which is published for the farmers, is mostly written by themselves; and has a great circulation among them and other persons interested in agriculture.

8. From the profits of that journal, has been purchased, in the vicinity of Wiesbaden, a small estate of ninety-two acres, for an experimental farm; where, by degrees, the different modes of culture are tried, which are thought suitable for the Grand Duchy of Nassau. They have now in operation five different rotations; meadow culture, nurseries for fruit trees, hop yards, vegetable gardens, and regular horticulture. The results of these various experiments are published in all the details.

9. The best farm in every court district is selected, as a model farm, provided the owner will meet the wishes of the society and introduce such a mode of culture as would best suit for that district.

10. For nineteen years past there has existed an agricultural society, the members of which are mostly farmers, owners of large and small farms, civil and military officers of various grades. The committees hold six meetings yearly in the different districts of that country, and one general meeting, where prizes are distributed for compositions in writing. At these, premiums are distributed to male and female servants, and laborers in vineyards in fruit and vegetable gardens, for good behaviour, or for superior order in work, &c.;

for fine horses, cattle, sheep, swine, and for the best management of bees; for introducing a new or better kind of manure or a better mode of preparing such, &c., &c. These prizes amount to from five hundred and sixty to six hundred and forty dollars annually.

11. The society is in possession of numbers of blooded breeding mares, which are distributed gratuitously among the members; in return for which they have to give the second and third fillies raised from each mare.

There is a pasture, where the fillies which are raised for breeding by the farmers of Nassau are gratuitously kept. The society has also an improved stock of cattle and sheep from which the villages receive bulls and rams.

Since 1833, the government has appointed an officer who attends to all affairs concerning agriculture; he is at the same time director of the agricultural schools and experimental farms; secretary for life of the society, and editor of the Agricultural Journal and Annals of the Agricultural Society. The government councillor Albrecht, of the Grand Duchy of Nassau, at one of the meetings of German agriculturists, when the question of instructing children in public schools was discussed, observed that—

"Since 1817, there had existed, in Nassau, an institution for school-teachers where all the branches of natural history and agriculture are taught, not with the view to educate the teachers as practical farmers, but to give those men who are destined to live among the farmers and charged with the education of children who will inherit the same occupation, a theoretical knowledge of agriculture, so that correct views on matters of agriculture might be diffused in common schools. I, myself, said he, have been for seventeen years in succession professor of agriculture, and my friend the medical councillor, lectured on natural history about as long as I did in the same institution. We both can give the assurance that those young men whom we educated for teaching were mostly sons of farmers, who had obtained no other instruction than that of the village school; that they listened to our lectures with undivided attention, and with great advantage; that they proved this when they obtained situations as teachers; for they disseminated correct views and awakened a love of agricultural knowledge among the children. To this may be ascribed the fact, that the greatest number of pupils at the agricultural school at Idstein, from 1818 to 1833, and at Wiesbaden from 1834 to 1843, came from those schools where our pupils laid the germs of that knowledge; and it grows vigorously.

These comprehended the more scientific branches of natural history and agriculture with much more readiness, and in their practical career applied them with more judgment and advantage than the sons of proprietors of large estates and better education. We found, by experience, that young men who have not enjoyed a scientific education, are, nevertheless, capable of understanding a scientific lecture, and able to follow the road pointed out to them.

This I mention, in order to show that young men from the country, with a limited education, are, without a scientific or collegiate training, capable of a higher degree of culture in the art of husbandry.

The various exertions, by societies and governments, to enlighten the mass, cannot fail ultimately to produce this desirable result—that the mass will eradicate that pernicious weed which impedes every progress in regard to liberal institutions; and when all the roots of the *feudal system* are destroyed, the German farmers will form one of the happiest classes of men in the civilized world.

XVIII.—*Biennial and Three field system of Germany.*

Biennial system on the Rhine.—I have spoken of the plains and hills, covered with fields weighed down by heavy crops; fields which have been thousands of years under cultivation, without refusing the industrious laborer a rich harvest. To the practised agriculturist, such a sight is highly interesting, and, as a matter of course, he will ask, What is the principal mode of culture, the usual rotation of crops?

And he will be astonished to hear, in this enlightened age, that the fallow, or three field system, is still in use in two-thirds of Germany. Yes, this barbarous system, the sign of darkness and ignorance, (as some great book agriculturists have named it,) is, notwithstanding all the abuse heaped upon it, the very system which has saved Germany and all those countries where it exists or has existed, from that utter exhaustion of the soil, which would have ensued there, as in those countries where the barbarous practice is followed of planting corn after corn, tobacco after tobacco, until the generous soil sinks, as if feebly making its last effort, into a state of exhaustion, such as only long repose and careful nursing can retrieve. It is due, then, to the fallow system, that the soil of the old countries remains in a state of fertility, which will enable it to produce good harvests for ever, if the usual care is bestowed upon it.

In the thickly peopled parts of Germany, as on the Rhine, we find the biennial, the four field system, and the extensive rotation of crops, and in the mountains and plains of the north, the alternate system of grain and grass, according to the climate and wants of the people.

In those parts of Germany, where the feudal systmes have been partly abolished, where the division of property, or other obstacles have allowed it, the three field system is in an improved state, and the naked fallow is covered with a thick crop of clover or other fallow crops. The benefits of a judicious rotation of fallow crops is well understood in some parts of Germany; and we must not, in the common style of writers upon Germany, break out upon the ignorance, obstinacy and barbarism of the farmers who have not yet adopted the scientific method, a method of producing straw and very little grain, as we see in some parts of England, and as Arthur Young mentions in his reports to the board of agriculture, where he gives some of the rotations practised in England, as a proof of "barbarous ignorance." He says, for instance, "fallow; wheat; wheat; barley; barley; oats; oats; oats; and oats as long as the soil will bear it." It seems that the ancients were impressed with the idea, that the soil, as well as man, requires rest; that neither the human frame nor the lifeless soil can exist continually without it, they soon lose then their strength, unless due repose be given them. Fallow was considered to be the night rest for the soil, the production of grain its day work.

Virgil and Columella recommend the alternation of fallow and wheat, as the only way to keep the soil vigorous and productive. A like two-field system we find in use in England, in the south of France, and along the Rhine. Was it brought thither by the Romans, to whom we ascribe every thing which has the least indication of good sense? Or did the native sagacity of each country direct it to the same idea, that the soil must have rest? This we leave to the learned to decide; and we content ourselves with the fact, that the two-field system is still in use, in some parts, on the Rhine or the Moselle. Before that region was so populous; while consequently, the estates were more extensive; and before the culture of fodder plants had become known, the change of manured fallow, wheat; naked fallow, rye; naked fallow, oats; and then the fallow manured again, was the common mode of using the land. Only one-half of the field was in use; the other in fallow; a method which required less manure, less seed, and less labor than the three-field system. The cattle, especially the sheep, found sufficient food upon the fallow; furnished for one-eighth of the whole area, the necessary quantity of manure. With nothing else, this method produced sufficient grain for a thin population, and provided for all their wants. Rude and primitive as their system was, it had this great advantage over many modes of cultivation practised by civilized people of the present epoch, that it was a regular system, in which the land was allowed to rest on alternate years, and was every six years, once manured. Necessity, the mother of all improvements, at length obliged the people on the Rhine, to produce more grain and fodder; consequently, the naked fallow was gradually planted in clover and other fodder plants, in root crops, and commercial plants. This is a change, which, in the two-field system, is less difficult than in the three-field system. Hence from time almost immemorial, regular rotations of crops were practised on the Rhine, so similar to some of the modes pursued in England, that Schwertz says, "either the English went to school to the Germans or *vice versa*."

We find, for instance, the following rotation on the Rhine and Moselle: 1. Turnips manured; 2. Spring barley; 3. Clover; 4. Wheat or spelt; 5. Naked fallow manured; 6. Rye; 7. Peas; 8. Oats. Or 1. Turnips manured; 2. Spring barley; 3. Clover; 4. Wheat; 5. Naked fallow; 6. Rye. Or, in district with a light soil, where meadows are scarce and consequently the supply of manure scanty; 1. Fallow manured; 2. Rye; 3. Clover; 4. Oats; 5. Fallow without manure; 6. Rye. Or, under like circumstances as above mentioned; 1. Fallow manured; 2. Wheat; 3. Clover; 4. Oats; 5. Winter barley manured; 6. Rye sown with white clover for pasture; 7. Pasture; 8. Rye. In the Bavarian province on the Rhine the Pfalz, we find the following excellent rotation of crops:

1. Tobacco manured; 2. Spelt and tares in the stubble; 3. Spring barley and in the stubble turnips; 4. Clover; 5. Spelt or rye; 6. Maize potatoes, beets—manured.

The tares after spelt in the second year, are ploughed in, as green manure for barley.

Schwertz says, that this is the best rotation he ever knew to be practised, either in England or Belgium. Where tobacco is more extensively cultivated, the rotations are: 1. Tobacco manured; 2. Spelt or rye, with tares in the stubble for the same purpose as mentioned above; 3. Barley and turnips sown in the stubble; 4. Tobacco manured; 5. Spelt or rye; 6. Beets, potatoes. When barley or linseed is planted after turnips, it is considered as injurious to both crops; but where turnips are in the stubble of barley, they succeed exceedingly well.

Near Landau, upon soil of middling quality, 1st. Hemp, heavily manured; 2. Rye, planted; 3. Spelt; 4. Oats; 5. Clover; 6. Spelt or rye; 7. Potatoes; 8. Barley or rye; all after one manuring, which was in the first year, to hemp.

In Alsace, where a great many plants are cultivated for technical purposes, and are called by the Germans *commercial* plants—as tobacco, hemp, flax, poppy-seed, rape, madder, &c., the biennial system is considered the most advantageous: for instance, on a *sandy soil*, where madder succeeds the best—1 and 2. Madder; 3. Wheat; 4. Clover.

1 and 2. Madder; 3. Rye, with turnips in the stubble; 4. Potatoes; 6. Maize topinambur.

1. Tobacco; 2. Rye with turnips; 3. Potatoes or hemp, peas, maize; 4. Rye with turnips.

Upon a clayish sand soil.—1. Potatoes manured; 2. Rye; 3. Clover; 4. Hemp, heavily manured; 5. Rye or wheat; 6. Maize.

Upon a *heavy, rich clay soil*, containing eighteen to twenty per cent. of lime:—1. Hemp or tobacco, heavily manured; 2. Wheat with turnips; 3. Beans; 4. Wheat; 5. Clover; 6. Wheat, with turnips in the stubble. Or, 1. Hemp or tobacco manured; 2. Wheat; 3. Barley; 4. Clover; 5. Rape; 6. Wheat, and turnips afterwards in the stubble. Where manure is easily procured from the neighboring cities, tobacco and madder follow at shorter intervals in the rotation; the soil is allowed manure every year; for instance, 1. Tobacco; 2. Rye, and turnips in the stubble; 3. Tobacco; 4. Rye, with turnips. Or, 2. Madder; 3. Grain; 4 and 5. Madder; 6. Rye.

The name of *biennial* system was given to this, because in it the fields bear first grain, and then a fallow crop of such plants as require hoeing or working with the plough, during the principal periods of vegetation, so that the field is kept free from weeds; or the fallow is sown with sucn fodder-plants as leave sufficient nourishment in the ground, through the leaves and roots, &c., (as clover, tares or lupines,) and prepare the soil for the grain crop that is to follow. Crops of an exhausting nature require, upon poor land, a great quantity of manure; therefore this system is always practised near large cities.

When Charlemagne made the three-field system the system of his empire, it seems that he enforced it upon the new settled countries, where it could be most easily established; for we find, near his capital and his summer palace on the Rhine, the two-field system still in use. His principal object, no doubt, was to secure a sufficient supply of grain for his people, and to protect the soil from exhaustion, by allowing it to rest at the regular intervals of every third year. He must have been himself an experienced agriculturist, from the fact that he allotted, to every village, meadow and pasture land, in proportion to their fields, in order to enable the farmer to produce sufficient manure to keep his fields in heart.

The three-field system, as I have mentioned, is still very extensively in use in Germany. Under it the fields are divided into three equal portions, which are thus used: 1. Fallow, manured; 2. Wheat; 3. Barley; then again, 4. Fallow; 5. Wheat; 6. Oats; and generally, in the seventh year, the fallow is again well manured. Upon sandy soil, instead of wheat, rye is planted; and instead of barley, oats.

The cattle are pastured during summer upon the fallow or pasture lands; and in winter the meadows supply the necessary fodder. This system requires a sufficient quantity of meadows, which are either in the immediate neighborhood, or in the vallies on the shores of some river, sometimes several miles off; but we find throughout Germany the villages organized in this way, and the farms lying separate were equally provided with a certain portion of meadow and pasture land. It is a regular system, which always has yielded fine and sure crops, plenty of straw, required less labor and capital than a more complicated system, and was suited to the intelligence and wants of the population of that early period.

It is well known throughout Germany, that this system has its faults, that it requires a great deal of land and cannot be carried on without meadows: but many obstacles are in the way to prevent the farmer from adopting a more improved method.

Since clover has been introduced as a fodder plant, the three field system has been greatly improved in some parts of Germany. Schubart thought that all the meadows could be dispensed with at once, and used exclusively for the culture of grain: that a rotation of clover, wheat, barley; clover, wheat, barley, &c., would amply replace the meadows: and that the farmers would thus double their income: but those who tried that clover system, and planted upon the first furrow which turned the clover, wheat, barley, clover turned in, and wheat again, found that their fields were, in a short time overrun with weeds; that the crops yielded straw, and little grain; consequently this system was abandoned, and the old system continued.

But experience has taught that a judicious use of clover enables the farmer to dispense with a part of his meadow land and yet keep the soil in a proper state of cultivation; it supplies the wants of the cattle, and consequently furnishes the necessary manure. The best rotation is considered to be when the fallow-field is planted half in clover, and the other half left for the naked fallow. 1st. One half clover, half fallow, manured; 2. wheat; 3. barley; 4. fallow manured clover; 5. wheat; 6. barley and oats. The fallow is sometimes planted with root crops—as beets, potatoes and also tobacco, but these are exceptions to the general rule; and would lead to an innumerable list of different rotations of 3, 6 and 9 years, as pursued now in different parts of Germany. As much as this system has been cried down, under certain circumstances it has its advantages; upon fields far removed from the farm yard; upon large estates, and upon heavy soil, fallow allows the best preparation of the land for winter grain. It produces rich crops, with 25 per cent. less manure; and consequently requires less cattle, less fodder, less labor; and is important, especially in those countries where cattle yield little profit. The work spent upon fallow is less expensive, and the yield of grain always greater than in any other mode; the labor of the cattle is more equally divided than in the rotation of crops, when the greatest part of the work is to be done in the spring. Here it requires only the planting of barley, which is generally done in the first furrow; and the fields are ploughed over in winter. The planting is soon over, and therefore the best moment can be used for it.

After fallow, every kind of grain succeeds well, and the work altogether is less than in the other modes of cultivating the soil. It requires less capital, and has less risk. Throughout Germany, clover is planted in fallow; but in districts where meadows are abundant, clover is less cultivated. In Wurtemberg the fallow is partly planted in clover, and partly used for pasture for sheep; to which it yields the best kind of pasture—especially for the finer kind of merino.

Improved fallow, with the assistance of some meadow, works perfectly well; and, in case of the failure of a clover crop, tares, oats and peas are sown, as substitutes for it; but throughout Germany, where the soil is not too poor, clover succeeds exceedingly well. Upon good wheat land it yields two fine crops, and sometimes a third. Plaster of Paris is every where in use. A traveller passing in summer, through countries where the three-field system is carried on, in the old fashioned style, sees along the road for miles, nothing more than a naked fallow field, with a few sheep and a hog upon it; no hedges nor fences; no extensive clover crop, except upon a few fields near the villages. No doubt he is astonished; and especially when he comes from England, Belgium, Holland or the Rhine—such a sight must make an unpleasant impression. But, before we blame the good broad shouldered Germans, let us inquire into the cause of the unimproved state of things and we shall be more lenient in our judgment.

Through the greater part of Germany, exists still, in all the glory of ancient times, the feudal system—a system which is a barrier to every improvement. My readers, who are free born republicans—unrestricted in the use of their property, paying little tax, and owing service to none but the state itself—will be astonished at the facts which I am about to give. I myself have been a director of large estates, where the feudal rights of the proprietor had been partly changed into yearly taxes; but those obligations upon which the prosperity of the lord's estate depended, have been strictly exacted from the peasants.

The German farmer is a free owner of his property; he can sell and change it, &c., at pleasure; but he has first to ask the lord for his consent to any such transfer of property. This is granted on condition of paying two and a half per cent. from the amount for which it is sold, and he who buys it has to pay five per cent. more—making together seven and a half per cent. For his property, he pays taxes to the government, works on the national roads, and serves as a soldier for the defence of his country from five to seven years. From his fields and meadows he is obliged to give the tithes which he has to prepare ready for housing—even from his cattle, sheep, fowls, down to their very eggs—he has to give the tenth part to the church or other institutions.

The old due of personal labor for the lord has been partly reduced into a yearly money tax; but it yet exists; and then the farmer has to perform all the field work of his superior, (such as planting, sowing, harrowing, &c.,) with his own cattle and implements, and as a matter of course, in the best part of the season. Besides this, he is obliged to mow the grass and bring the hay to the yard; to assist a certain number of days during harvest time, and to house the crop; to bring manure out to the field; to haul all the wood required at the lord's estate; to thresh a certain number of days; and to carry the grain to a distant market, with his own horses and wagon—sometimes being several days in going and returning!

This is what farmers have to perform; there are other things for them to suffer. The lord has the privilege of pasturing his live stock upon their fallow fields and pastures; of keeping his game upon their fields; and on hunting days they are obliged to lend him their aid.

Besides this tithe, they have to give a certain quantity of marketable grain, which they have to furnish to the granary of their lord at a certain period; they must fill it in bags and transport it to market, as just mentioned. Then, too, come the priest with his right; the school master, and all the persons employed in the service of the village, as herdman, watchman, &c. &c., for their shares. Is not this list of obligations frightful, and enough to dishearten the farmer from undertaking any amelioration of his property? Suppose he plants the fallow with some crop? He has to give one-tenth to the lord or priest; and how can he attend to a more complicated system of culture, when his best and most precious days of the spring are levied upon for his lord? We ought to sympathize with this oppressed population, instead of blaming them.

Another obstacle to improvement lies in the division of property. Of this I will say a few words hereafter. In some districts it has reached the highest point; and it is almost impossible to divide the earth into smaller parcels, except you turn it into dust.

Suppose a farmer owns in a field a half acre of ground, which is surrounded by other land, planted in wheat? He has no road to it; therefore it is inaccessible to him, except by paying for the damages produced upon the adjacent grounds—which damages would amount to more than his whole crop is worth. He is therefore obliged to follow the common system of the others.

In some parts of Germany exist laws, according to which the farmers are bound to follow the three-field system.

All these obstacles must be abolished, before any material improvement can be expected.

The valleys of great rivers in all new countries attract the first settlers: the natural water routes link them together, and favor their undertakings. The advantageous location of the first inhabitants on the Rhine must have doubtless caused many a bloody scene among the jealous aborigines of Germany's impenetrable forests. When the Romans pierced to that valley, they found it already populous and cultivated; so that their conquest was not an easy one. Indeed this valley has always drawn to it whatever race became masters of Germany; the climate, its products, and the facility of navigation, attracted a numerous population. Its chieftains of rude times, like eagles, built their rocky fastnesses upon the summit of the many hills, and watched from their castled crags the poor whose humble dwellings clustered together like the nests of swallows under the protecting rocks of the sloping shores. The population has continued to increase from time immemorial, and property has been divided and subdivided until it has become impossible to divide it any longer, unless by the spadeful. It is really curious to see an extensive field, on the banks of the Rhine, divided into a few furrows and planted in different crops, that make a mixture of all sorts of colors; no fence nor hedge separates the property; a few rocks set in a line, direct the ploughman to keep within the limits of his narrow territory.

Such enormous estates as we are accustomed to possess or to procure for a few hundred dollars, are not to be heard of in the Rhenish provinces. The estates of nobles, which, in all countries of the continent, are the most extensive, and which sometimes exceed a western farm, are here few and small; and they who count a couple of hundred acres, rent it in small parcels to a much greater advantage than they can husband it themselves; so that farming operations are conducted on a very limited scale.

Near Cologne, the rent is, on an average, from six to eight dollars per morgen,* and it is augmenting in ratio with the population. The factories pay the farmer good prices for his products, and employ his children in various operations; the small patches of vineyard remunerate the laborer, provided he pays attention to the improvement of his wine, but, notwithstanding, as the country is not made of India rubber, in spite of economy and industry, thousands live there without a foot of property, and this forces many to seek a home in foreign lands, where they can employ themselves in their favorite occupation of tilling the soil, man's noblest and best pursuit.

The landed property throughout Germany, is divided into estates belonging to the crown, to nobles, and to the peasants, then subdivided into whole *Bauernhofe* (entire farms) half farms, quarter farms, one-eighth farms, and at last comes the house owner, with a garden, and even sometimes an acre of land. The number of acres varies according to the greater or less amount of population, but the parcels on the Rhine are very limited. A *Rittergut* of two hundred acres is considered an extensive estate; a whole farm of forty, and a half farm of twenty-five acres, a fortune. The house owners believe themselves well off if they possess one or two acres of land; some must try to live from one-fourth of an acre. The number of small farms is very great in the Rhenish provinces: for instance, the district of Cologne comprises 75.65 German square miles, which is parcelled out into 161 estates of nobles, 2,325 full span or whole farm, 19,106 half span, and the rest, amounting to 19,106, is held by house owners, with from a half to two acres, working it with the hoe, spade or their cow. This unlimited system of division has been favored by home governments, with the idea that small estates are generally better cultivated and yield higher profits; but the injurious result has made them aware of the necessity of restricting the division to that of the large estates: that is, of confining it to a certain number of acres which will support a family, according to the state of soil and other local circumstances. Another injurious effect was produced by the division of the common property of villages; the villagers who opposed that law were considered as obstinate and blind to their own interest; but experience, the test of all theories, has shown that the measure did more harm than good.

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* One morgen is 1 acre, 1 rood, and 26 perches.

XIX.—*On Wheat, Tobacco, Spelt, as cultivated on the Rhine.*

Wheat being one of the principal products of our farmers, I have thought it might be of some service to collect, in the different countries through which I passed, the experience of the most eminent agriculturists on this subject. Schwertz, who is so well known by his various agricultural works, has described the mode of cultivating wheat practised on the Rhine, collected from authentic sources, from which I have made the following extracts, with some additional notes from other writers on German agriculture, and my own experience and observation.

The wheat cultivated along the Rhine is the ordinary winter wheat, of a yellow color, without beard; there is another kind raised with a beard of a brown color, which is considered not as profitable, as it yields less grain and more straw.

On the Rhine, especially in Alsace, wheat is planted after tobacco, hemp, beans, Indian corn, potatoes, cabbage, poppy, turnips, clover, and in fallow, though this is very rarely the case.

Tobacco is considered the best preparatory crop for wheat; it is estimated that it yields one-seventh more after tobacco than after any other crop, which arises first from the great quantity and superior quality of manure which is used for the tobacco crops, and secondly, from the careful and separated labor which is given to tobacco. Even if it should happen that the tobacco crop was taken late from the field, the wheat crop succeeds admirably well.

Hemp is considered another excellent crop, after which wheat succeeds well, principally when the manure is stronger for hemp than for tobacco. It is an established fact that hemp leaves the soil perfectly free from weeds, even without giving it any labor whatever. I believe that the wheat crop after hemp is not so much esteemed in regard to the yield of straw. The farmers pretend to have observed, that after cabbage, wheat yields less straw; others say that 120 sheaves, in such a case, yield as much grain as 150 from crops after tobacco.

The naked fallow is considered yet the best preparation for a heavy argillaceous soil.

In cases where there is not sufficient quantity of manure, the farmers are forced to fallow the land. It is estimated that the crop yields at least one hectolitre* of wheat more to an arpent of twenty ares.†

Beans are considered, throughout the valley of the Rhine, an excellent preparation for wheat, but it is believed that wheat yields less after beans than after tobacco, hemp, or poppy, and of inferior quality, which accounts for the fact, that in some parts beans are put in a summer field, after which another fallow crop succeeds before wheat is sown again.

After Indian corn, the grain is full and of fine appearance, yet it yields only one-half the quantity of straw that it yields after other crops, but I found places where wheat, after maize, yielded amply in grain and straw, and other places, again, where Indian corn is considered the worst preparatory crop for all sorts of grain.

Similar facts, just as contradictory, have been furnished to me in regard to clover. Sometimes it is considered the best crop to precede wheat, and in other places, of middling order; but experience has settled that question so far, that no where can a good crop of wheat be raised after a poor crop of clover. But every one agrees that wheat yields more straw after clover than after any other kind of preparation. The same thing happens with wheat after turnips—it is richer in straw than in grain.

In some places, wheat after poppy is thought highly of, and is preferred to wheat after clover or beans.

After madder, wheat succeeds well, even in a sandy soil, provided the land is rich. I have seen many rotations of similar kinds in Alsace; but I never saw wheat sown after another crop of grain; it is sown sometimes, though rarely.

Potatoes are considered a good preparatory crop for wheat; it falls a little short of fallow wheat, but is less liable to lay down.

One ploughing after tobacco, one after beans, three after Indian corn, and one or two after hemp, are considered sufficient for the preparation of wheat crops.

After a vigorous and well stocked clover crop, one ploughing is thought sufficient; but when it is thin, having spots filled with weeds, two or three ploughings are generally given; when the clover crop was good, no manure is put on; but when the contrary, some is considered necessary to ensure a fair wheat crop. It is customary in this region, to let the third growth of clover come up as high as time will permit, and then plough it under. When two ploughings are given, the clover is turned under with a shallow furrow; the second furrow is made much deeper; when there is time, a third furrow is always preferred; the last two are made much deeper than the first.

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* A hectolitre is equal to 100 litres—the litre is 0.22 parts of the British imperial gallon.

† An are is equal to 100 square metres—the metre is 39.37 inches. An arpent is six-sevenths of an acre.

It has been found that wheat yields more straw after one ploughing, but that it yields more grain after it has received three ploughings.

At Wesselingen, wheat is sown in a peculiar manner, which is worth mentioning. A part of the seed wheat is sown upon the first furrow given to clover, then ploughed very superficially, after that the rest of the seed wheat is sown, and harrowed in with heavy harrows: the farmers of that district say that they obtain an excellent wheat crop. This mode is new to me. It may answer for light soil very well, which has not adhesion enough for a wheat crop when managed in the ordinary way.

The usual *periods of sowing* wheat on the Rhine, and in the southern part of Germany, is a week before, and about three weeks after Michaelmas, (September 29.) Wheat early put in the ground yields fine crops, but the only inconvenience is, that the weeds spread too fast; later, the wheat does not succeed well, it takes a long time to ripen. There exists a proverb among the Alsaciens, which says, "When wheat sown in the beginning of November (Toussain) succeeds, a father should never tell it to his children."

On the Danube is the best wheat country; wheat is sown sometimes very late, and considered safe if it only shows itself before the snow covers the soil; it grows under the snow, and when spring sets in, sometimes scarcely a plant can be seen. There exists another proverb: "When you have to look for your spring with pointed sticks, you are sure to fill your barn."

In countries where the winters are very irregular, sometimes without snow, early sowing is recommeded to give the plant the necessary force to withstand the influence of the continual changes.

After hemp and tobacco, wheat comes up very soon. Upon clover, wheat must be sown two or three weeks earlier, or it is considered likely to fail.

The farmers throughout Germany pay great attention to the selection of their seed wheat; they know that with poor grain the common diseases of wheat crops are increased. The common diseases of wheat in Germany are mildew, blasting, blight and smut. Mildew is supposed to be produced from a sudden change of temperature, a cold shower of rain after a hot mid-day sun. Rust is considered a higher degree of mildew. *Elsner* thinks that wheat crops which are planted upon a turned clover stubble, are more liable to be affected by rust, because such crops are later in spring; but when they have once started, they grow so rapidly and luxurious, as to make the plant more delicate, and consequently more liable to the changes of temperature and disease. The causes of these various diseases are not yet understood; all the proposed remedies have been tried without a sure effect—the only and best preventive is a careful preparation of the soil, sound and perfect seed. Wheat a year old is considered the best. Fresh manure is also thought another cause of these evils.

The average quantity of seed wheat is estimated by *Thäer* at two hundred and forty-two litres per hectare.*

In France, two hundred litres are generally calculated per hectare; and an old French proverb says, "Mieux vaut semer aru que menu"—better sow too much than too little.

The soil and its fertility regulates the quantity of seed; in the rich bottom lands of the Danube, wheat is always sown thinner than in the less fertile or suitable soil of other districts.

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*The hectare is equal to 10,000 square metres, or 2.471 acres.

After clover one-third more seed wheat is used than after manured fallow or tobacco.

On the Rhine, especially in Alsace, a part of the seed is ploughed in, sometimes one-third, sometimes one-half, and the rest is sown upon the field after ploughing, and is harrowed in; in other parts, where the soil is of a heavier nature, it is harrowed in altogether.

The wheat ploughed under in that way is thought to stand better the winter and the winds, and in a well prepared soil it is considered the best method; but when the soil has not obtained the necessary work, it is thought better to harrow the grain in.

Upon light soil it is generally ploughed under, and yields very well, at a depth of three inches. Sheep and horses are driven sometimes upon wheat fields, to feed upon them. This has a similar effect to that of topping. They are only brought upon the wheat field in the autumn or during the winter. In Alsace they bring in sometimes the sheep and horses in the beginning of May, which is rather a dangerous operation. Cows are never permitted to enjoy this privilege.

The grain is considered to be ready for cutting when the kernel has acquired a certain consistency, and when the farinaceous substance is entirely developed, it is cut even if the grain is yet somewhat soft, (grain too much ripened is thought less fine in appearance, and of less good quality,) and left upon the field to ripen.

In Bavaria, wheat is cut with sickles, and only about half way from the ground, the ears laid upon the high stubble and left to ripen, which has many advantages. In the first place, it requires less room in the barn: secondly, there is less danger of its sprouting in the field if rainy weather should happen to continue for some time; thirdly the work of gathering and bringing from the field goes on more rapid, as there is at least one-third of straw less to be brought home: fourthly, threshing, which is done every where with flails, is done better and quicker.

Some give it a top dressing with soap boiler's ashes, during the fall, others one with long manure.

Different modes are practised on the Rhine, and beyond that river, in the treatment of wheat crops in the spring. Harrowing is very common. After a few days fine weather, when the soil has sufficiently dried up and the wheat begins to show itself, the crop is well harrowed with heavy iron harrows. Weeding is generally done by women.

When the wheat crop grows very luxuriantly, the farmers, in order to prevent its laying, top the crop, that is, the leaves are cut off with sickles or scythes, without touching what they call the heart of the plant, the stem grows stouter and prevents it from laying; but this is a long tedious operation and an expensive one.

It is always performed in fine mild weather, but never when there is a strong north or north-west wind blowing, as this turns the crop yellow. The stubble remains on the field until the crops are all secured, and then it is mowed and stacked in the field, or near the barn.

Sometimes when there is less need for straw, the cattle are driven in the stubble to feed upon the grass between it, it is trodden down in that way, and before winter sets in it is brought together with rakes and stacked.

Wheat is considered one of the surest crops, as it very seldom entirely fails, provided the land has been properly prepared for it.

The opinions are divided in regard to the effect of steeping grain to prevent disease. Many have found it highly useful. A Mr. Sender, of Rottenburg, employed, for nearly twenty years, seed wheat a year old, which he steeped in a ley made of leech ashes and quick lime, and his fields were free from brand all that period; but after he left off using new wheat instead of a year old, the evil returned at once, and in 1836, it caused an enormous loss.

He obtained, he states, a recipe to prepare a steep, which is used very extensively in Poland, consisting of glauber salt, ashes and quick lime. Sixteen Berlin scheffel,* requires one-eighth of a Prussian cwt. of glauber salt, one scheffel of lime and the ley of one scheffel of ashes; with this solution the wheat was moistened, and well mixed, and left for twenty-four hours in a heap. The effect was astonishing—there was not the least appearance of brand on the whole field except at a corner where the prepared wheat gave out, which suffered again from brand.

This led me to the conclusion, says he, that the seat of the evil is in the grain, which carries with it to the ground the eggs of an insect which affect the plant, and consequently destroys the development of the ear. I examined many wheat plants, affected in this way, and which were carefully taken up with the root; on examination I found, that just above the roots they were eaten through all round, and discovered, in the inside of the culmus, (halm,) a black worm, with a thick, horn-like skin, tapering at each end to a point, which might also explain why wheat a year old is less liable to produce brand, the eggs of the insect having lost during a year's keeping, their vitality. Schwertz mentions an interesting fact in regard to the effects of steeping. A farmer mentioned to him that he used lime and the drainings of the dunghill, and after twenty-four hours prepared in that way he applied it, but it was never free from *blast*. In 1794, said the farmer, "I prepared my seed wheat as usual, but I was prevented from sowing it till after the third day, when the grain began already to sprout, and to my astonishment the crop was free from blast. It is now twenty-two years that I have followed the same method and I have found only one single ear which was attacked by that destructive disease."

The celebrated naturalist, Dr. Martius, of Munich, described it as a kind of fungus which adheres to the grain and spreads gradually over the plant and disturbs its vital functions and causes all the different diseases known under different names. Dr. Martius recommends steeping the seeds, as the best and only means of destroying the fungus, which lose not their vitality, even after keeping the grain for years.

The change of grain for seed is practised throughout Germany, and it is considered very important to obtain it always from a soil which is well adapted for wheat, &c.

Spelt.—Dinkel or spelt, as the Germans call this kind of wheat, has been more extensively planted at earlier periods in Germany, than at present; it is one of the oldest kinds of grain which seems to have been known to the Egyptians. It is principally cultivated on the upper Rhine, in Franconia, Wurtemberg, Baden and Switzerland: there are two kinds used, one with a smooth kernel, the other a rough one; the ears like the wheat, have beard or are without it. Schwertz thinks, that wheat or spelt, without a beard, when sown upon a poor field badly prepared, have ears with beard, and *vice versa*. The red spelt is considered the best kind.

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*A Berlin scheffel is 1.479 of an English bushel.

Where wheat succeeds, spelt will yield heavy crops, but it grows upon less compact and rich soil, and insures good crops, which makes it, in many cases, preferable to wheat; it succeeds after many a crop, after which wheat could not be planted, and is therefore very important in rotation. On the Rhine, upon light soil, it is sown upon clover stubbles and ploughed in with a shallow furrow. In the spring it is rolled. It is sown about the same time as wheat, and it is not uncommon that it is sown in the month of February, it ripens a little later, but yields fine and heavy grain. The spelt is sown as it comes from the ear with the husk, and requires, consequently, a great quantity of seed; four hectolitres per hectare is considered sufficient. On the Moselle, rye is mixed with one-fifth spelt and sown together; both seem to succeed better, and the spelt is easily separated from the rye, and much better in that respect, than wheat and rye.

Harrowing in spring and cutting the leaves, is very serviceable to spelt.

Spelt suffers very seldom from blast, and is less liable to the common diseases of wheat. When the stem (halm or culm) begins to turn white, which is generally about the middle of August, the spelt is cut. On the Rhine the spelt is cut and housed the same day, provided the weather is fine. It can be immediately threshed, the ears break off very easily, and treading it out with horses or cattle would do just as well. The grain does not separate from the husk, requires more room in granary, but keeps better than wheat and is less liable to be injured from insects or rats. It is sold in that way. When the grain is required for use, the husks are rubbed off at the mills, which have a pair of stones for that purpose; the grain is separated, cleaned and ground to flour. Upon good spelt soil 48 to 50 hectolitres are calculated per hectare, to be a good average crop. A hectolitre which weighs 42.24 kilograms* yields ten kilograms of husks, two kilograms of offals and thirty kilograms of grain; one hectare yields forty-eight hectolitres of spelt =1479, five kilograms which gives 1332 kilograms of flour.

One hectare yields 22 hectolitres of wheat = 1694 kilograms, which gives 1415 kilograms of flour.

Wheat which gives per hectare 83 kilograms, more flour.

The flour from spelt is considered finer and whiter than that from wheat, and it is used by confectioners; it goes further in cooking than wheat flour, but bread from spelt flour is of a rather drier nature than wheat bread.

Schwertz sums up the advantages and peculiarities of spelt and says:

1. Spelt grows upon bad and poor soil but poorly, it succeeds upon that which is too dry or too wet for wheat, but upon good wheat land it grows *exceedingly well.*

2. The field requires the same preparation as for wheat, but, is not injured by late manuring, or top dressing, as wheat is.

3. Requires less manure, and less original fertility of the soil than wheat.

4. Grows well after other crops, and even after spelt itself, which may be ascribed to the fact, that spelt exhausts the soil less than wheat.

5. It is less liable to disease, especially blast, than wheat.

6. Birds injure the crops less while on the field.

7. But it lays down and its ears are easily broken off, and has in that respect no advantage over wheat.

8. Rainy weather is not less injurious to spelt than it is to wheat, but it can be immediately housed, sooner than wheat.

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*A kilogram is equal to 2 pounds 3 ounces avoirdupois.

9. It requires more room at the granary, but keeps better than wheat.

10. Spelt yields a very little less flour than wheat.

11. The flour is white and finer, but the bread from it is drier than that from wheat.

12. The spelt straw is a little more stiff than that of wheat, but it makes not only fine cut straw for horses, but excellent fodder for cattle.

In countries where they make straw hats, they use the straw of spelt in preference to others.

Mixture of Rye and Wheat.—A mixture of wheat and rye is sown here very frequently, and it is considered to succeed better than when one or the other is sown alone. The Germans use rye for bread, and only on certain holydays they use pure wheat for bread. A mixture of wheat and rye gives an excellent bread, which is considered more healthy than either wheat or rye alone. It is said that it ferments better, and that the bread keeps better; generally they bake only once a week and use stale bread, as hot and fresh bread is considered unwholesome. This mixture of rye and wheat is less liable to lay down, the thin, longer stem of the rye gives room for the wheat which is always stronger to develope itself better and the air can pass through more freely. The mildew and other diseases of wheat is seldom observed, the straw of each kind is more vigorous and an acre of such a crop yields more than when sown each separately; it requires a less rich soil, and this mixture will succeed upon a light sandy soil, which could not be used for wheat alone; if the soil be more suitable for wheat, they take generally more of the wheat for seed, and for soil of light nature more rye than wheat.

Tobacco.—Experience has shown that tobacco planted at intervals for several years on the same field, and tobacco planted upon highly manured ground is not so well flavored as that which is planted upon new ground or meadows or after clover, or lucerne of several years' standing.

After fallow, tobacco succeeds the best, but that would be too costly in countries where land is so valuable.

Thorough rotten manure is preferred, and if fresh manure must be employed, it is brought on the field some time before the tobacco is planted, and left exposed to the influence of the weather, before it is ploughed under.

Schwertz gives the following method of planting as practised in Alsace. The time from the 27th of May to the 18th of June is considered the most favorable season for planting. When the land has been properly prepared, two persons can plant an arpent* of twenty ares in five hours, and six when the plants must be watered; in the last case, water is first put into the holes and then the plants; when it can be done the water of dunghills moistened with water is preferred and considered highly useful. From five to six thousand plants are reckoned to an arpent of 20,000 Prussian feet, which makes four square feet for each plant, sometimes they are planted thicker. This mode of planting at equal distances, is far from being the best; the leaf grows exceedingly large and perfectly covers the soil, so that it becomes difficult to approach them, and is a great impediment in the operation of picking the leaf. It would be much better to bring two lines much nearer together, and leave a greater space between the next two lines, which would allow persons employed in picking or other operations, to approach the plants easier, without injuring them, and the field would contain

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*An *arpent* is six-sevenths of an acre.

as many plants as in the old method. It would be a great fault to give less than four square feet for every plant.

When the field is planted, it requires to be examined several times, to see if all the plants have taken root and to replace plants which have perished. There is in this country a kind of white worm, which injures the young plants.

Weeding and Picking.—The tobacco is weeded and hoed, at least once. The first weeding is in June, as soon as time allows one to attend to it without waiting until the plants have grown stout. A warm damp weather and a well prepared field favors the growth of the young plants. The field ought to be hoed as soon as possible, especially when it has been much trodden down during planting.

Hoeing is considered one of the most important operations for this culture. It requires three persons to weed an arpent of twenty ares, and five or six to hoe it.

They allow only seven or eight leaves to a plant to remain, including the leaves near the roots; all the roots are taken off. The leaves being the only object for the planter, he consequently pays all his attention to their prompt development, and cuts at four or five different periods, to the top of the stem, then the central branches, every time they shoot out open; this operation is absolutely necessary. Without mentioning the influence of temperature, of which the tobacco is as sensible as the vines, it has a great many enemies, such as hail, frost, wind, the grasshopper, the rust *(rost)* and the hemp blossom, *(orobranche ramosa)* evils against which, except the last one, there exist no remedies. The hemp blossom *(orobranche ramosa)* is a parasite plant, which grows upon the root of the tobacco and robs it of its sap. Tobacco attacked by this plant loses its leaves, though the damage is less considerable when this parasitical plant appears about its harvest time. The ravages caused by this plant are enormous among the tobacco, but it is the consequence of a bad management; and the planter is punished for his carelessness.

It is caused by a bad preparation of the soil, by the short intervals at which the tobacco is brought back into the same fields again, and especially by injudicious rotation. It is not difficult to destroy the influence of this plant entirely; by planting the field after tobacco, in grain, and after that in the different kinds of biennial crops, as for instance maize, potatoes and then should follow tobacco, by which the bad effects of this plant would be eradicated.

The frosts which are so common in Alsace about the month of September, are very injurious to tobacco, it destroys it completely, even when the sides only of the leaves have been touched. Whenever the leaves begin to turn brown, it is full time to harvest them.

Harvest.—When the leaves begin to ripen, small yellow spots are noticed having the appearance of being pierced, they begin to look shriveled; the whole surface of the field has a yellow color which is the signal for harvesting.

It is not well to hasten the harvest too much, though it may be necessary in order to prepare the soil for another crop, or from fear of a frost. The tobacco loses in weight when such is the case.

They have tried to introduce here, the mode of picking the leaves in succession, but it offered a great many difficulties; it cannot be effected without injuring the leaves which remain on the stem, and at a considerable increase of manual labor and consequently additional expense. It is an error to suppose, that the upper leaves of the plant, ripen later because they have been developed later than the lower ones. The upper leaves are more exposed to the light and air, and in consequence ripen as soon as the lower ones.

A royal ordinance which gave directions how to proceed in the harvest of the leaves, has produced a great many advantages, also the classification of the leaves according to their different sizes, the assortment of the bottom leaves, the picking of the tops and side branches, in short the whole culture is done with great order and system; the administration pays a higher price compared with former years, when the system was carried on in the old manner, and obtains a better article.

The leaves of tobacco taken from the stem, are put in bundles, and fastened with straw, and may remain in this way upon the fields for two or three, and even for four days, according to the state of the temperature. When all the leaves are gathered, the stems are soon drawn up to prevent them from exhausting the land unnecessarily. After tne roots have been freed from the earth, which is done by passing over it with a harrow, or by hand, the stems are placed out of the way of the plough. Some place them in the furrows, others scatter them over the following wheat crop, pretending they have a salutary effect upon the young plants, and in the spring they are taken off, and in different ways.

To lay the stem in the furrow requires a person with the plough. The tobacco crop prepares the field so well that only one ploughing is required for the following crops.

When the stems are placed upon clover or meadows and left there during the winter they produce a wonderful effect; they are taken up in the spring and used for firing, and the ashes are considered superior to any other.

Treatment of the tobacco at home.—It is not sufficient to bring the leaf to its greatest perfection in the field, the planter must pay the necessary attention to prevent its deterioration when housed, to which tobacco is more liable than any other crop. With the assistance of a long strong needle and twine, the leaves are strung together and hung up. In a few days these strung lines, which are loosely put together, are taken down and turned, and those which have been above are placed beneath, and in a few days more they are brought into a dry place.

In the places where tobacco is cultivated more extensively, proper buildings are put up to dry the leaves in, but generally the lofts of stables, &c., are used for it. The tobacco, after having been exposed to the frost without moving it from the place where it was hung up to dry, is at last taken down and put up in small bundles. In the first three weeks the tobacco is liable to become heated, it must be watched and every time turned when the temperature rises until the tobacco is perfectly shriveled, when it has arrived at that state, the whole crop can be put up in large bundles for sale.

Expenses.—The average crop of an hectare of tobacco in Alsace, amounts to about thirty quintares of dry leaves.

The prices are fixed by the government and are—

For the first class of tobacco	67 francs per 100 kils.[*]
" " second " "	56 " " " "
" " third " "	45 " " " "

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[*] One franc is about 20 cents. 1 kilogram a little more than two pounds three ounces.

Suppose that the harvest was an average one and yielded about twenty-five quintares.

First class, 300 kils. is	67 francs	201	francs
" " 450 "	56 "	252	"
" " 600 "	45 "	270	"
Small leaves &c., 150 kils.		30	"
The sum total of the whole harvest		753	francs.

Now let us compare the expenses; the following rates have been ascertained from good sources and are conscientiously examined:

We suppose the farmer has neither land, nor manure, nor servants and team, that he is obliged to pay for every thing in cash.

Rent for an arpent of twenty ares, at the customary rent paid for such land	100	francs.
Taxes, &c	30	"
Thirty loads of manure, a load for four horses, 720 francs; half of that amount allowed to the next crop	360	"
Hauling of manure, (half the expense)	120	"
Ploughing and harrowing	100	"
For 27,500 tobacco plants	60	"
Planting	15	"
First weeding	15	"
Second weeding and hoeing	30	"
Picking the head and side branches	40	"
Gathering the leaf and putting the stems and strings	120	"
For labor in the tobacco house	60	"
To putting up in bundles	30	"
Transportation of the green leaves to the farm, &c	50	"
Sum total of expense	1,190	francs.

When the receipt is compared with the expenses, a loss of 428 francs; this deficit is still more considerable when the bad years are brought into calculation; it is a known fact that every eight years the tobacco crop fails once. It would be no more than just to divide the loss of the eighth year among the seven good ones.

From this statement it appears almost incredible, yes impossible, how the farmer can continue to plant tobacco, but we must bring into consideration that the small farmer does all the work himself, assisted by his wife, children and servants, that he gives to this crop all his leisure moments, and never calculates the cost of his labor.

The same is the case with manure, which he considers as a preparation for the wheat crop; but notwithstanding all these allowances raising tobacco is a poor business, and it is not at all astonishing that the tobacco planters are adding every year to the poor list of that country.

XX.—*Mode of feeding Cattle and Horses, at Alcsúth.*

The order of feeding cattle observed at Alcsúth, is as follows: on the Marienthal farm the cows receive from 1st November to the last of March, every morning early, eight pounds of steamed chaff mixed with potatoes, at 7 drink and then one-eighth of a metzen* of turnips cut to pieces and mixed with chaff; at 3 again steamed chaff and potatoes, at 4 drink, at half past 4 again one eighth of a metzen of turnips mixed with potatoes, and at night maize straw. From the commencement of April to the middle of May, the cattle get instead of turnips a like quantity of potatoes cut to pieces and mixed with chaff; after this, the green fodder commences, in the order in which it is cut.

At Kinza, the young cattle during the winter, receive per head, in the morning, seven pounds of steamed chaff and potatoes mingled, at 7 drink, at half past 7 o'clock, one-sixteenth of a metzen of potatoes, cut to pieces and chaff, at 3 P. M. again seven pounds of steamed chaff and potatoes, at 4 drink, at 5 again one-sixteenth of a metzen of potatoes, cut to pieces and chaff, and at night coarse hay. During the summer, green fodder is given here likewise in the stall.

Calves one year old receive during the winter daily, in the morning, five pounds of hay, second quality, at 7 o'clock drink, at 8 three pints of oats soaked in water and mixed with chaff, at 3 P. M. again five pounds of hay, second quality, at 4 drink, at 5 again three pints of oats soaked in water and mixed with chaff, and at night two pounds of hay, second quality. Gelded calves under one year of age, receive both in the morning and afternoon one pound of hay less than those immediately preceding.

Draught oxen receive from the beginning of November to the end of February daily per head sixteen pounds of steamed chaff mixed with one-tenth of a metzen of potatoes. In order to keep the draught oxen in full strength during the hard work of spring, the cattle for draught receive from the commencement of March to the middle of May, besides the fodder above enumerated, every morning three pints of buckwheat meal and at noon five pounds of millet straw.

Milch cows get every week two ounces of salt to lick, calves (according as it may be required) from two ounces to two and a half and even three ounces every second week, per head.

Horses receive in the winter three times during the day, three halves of a metzen of bruised oats, and six pounds of hay, four pounds of oat-straw, and five pounds of steamed chaff without potatoes. During the summer the horses get at noon, green fodder instead of chaff. From the second week of their age, the foals receive a little oats, which portion is increased from day to day, in such a manner, that in their fourth month, they receive already one and a half metzen. From that time their portion of oats is increased until their sixth month to three metzen, and the oats henceforward are mixed with a third part of carrots. Of hay the foals obtain two pounds a day, and weather permitting, they are led daily to their grazing place, which is specially assigned to them, and which is surrounded with a fence.

The difficulty of obtaining good horses, the frauds so frequently practised in selling horses, and the great expenditures from procuring fit, faultless and durable horses are the reasons why on the manor of Alcsúth the stock of horses is used both for working and breeding, and so its demand for horses from time to time is supplied by its own breeding. The principal steed is the *Göbö Jâra's* out farm. Here studs only are used on the farm. A broad breast, a straight back, healthy faultless feet, a well-shaped light head constitute the appearance of these horses. The steed used here as stallion is from the *Bábolau* stud. He is of noble descent, his frame is strong and vigorous, and the Arab blood predominates. The studs are used for working every day throughout the year, with the exception of Sundays; they are spared however a fortnight, both before and after foaling. The thriving state of the studs and foals is the best evidence of the suitableness of the established order of feeding. The stable is plain and neat; it is high and light, in one word it is to the purpose and economical; the platform, obtained, by boards doubly folded one in the other, constitutes an arched vault, which is varnished to prevent bad air from perspiration, and there are wooden pipes arranged for leading off unwholesome vapors. For the greater convenience and to protect against colds, the watering is arranged in the stables. The watch is strict and punctual; to every two horses there is one man. For the attendance of the foals and the cleansing of the stables there are special servants.

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*One metzen is equal to one and three-quarters of an English bushel.

Agreeable as the general impression must be, which Swiss cattle at the Marienthal dairy makes upon the stranger, it is nothing when compared to the sight reserved here for the farmer, of the fine stock of Mürzthal cows. This race combines nearly every one, if not every excellence:—abundance of milk, disposition for fattening, and great strength for draught; and is raised here in its highest perfection. The full-blood of this race is characterized by the small shaped head with broad forehead and broad mouth, short and fine horns, extended body, broad back and handsome neck, high and slender tail of considerable length, fine bluish hair, big udder, and on the whole by the stately and soft entire appearance.

Those cattle that remain barren, are removed to Kinza, and are there used for draught, until they again grow ardent. The whole farm is managed by three persons who attend not only to feeding and milking, but also to the mowing and gathering of the green fodder. The cows are milked twice a day. On an average, each head gives seven hundred and fifty measures of milk; this at first sight may appear little, but it is owing to the fact that in the period of suckling, the cows are spared as much as possible. The bulls are used for copulating only to their fifth year, and are then sold. The cows are not coupled with the bull until they have completed two and a half years. Bull calves are put to the yoke after being over three years of age.

The arrangement of the cow house on the farm unites every thing that necessity and convenience require, and there is no where else in Hungary any thing like it. It is arched, high and well lighted. The manger goes through its whole length, in such a manner as to leave a plastered space of six feet in the rear, and of eight feet in front. The right wing of the farm contains the milch chamber, the filter and the milk cellar, together with the ice house. In the filter-room there is a well which furnishes the water to clean the vessels. All the reservoirs and so likewise the steps, staircases and benches are of red marble. The cleanliness observed here is exemplary, and deserves being imitated. The right wing of the farm is devoted to the calves, and contains the fodder chamber, where in summer the green fodder is spread on wooden scaffolds, in order to secure it from becoming heated.

The spacious yard is covered with sand, and the enclosure is not of stone or wood, which might cause the cattle to suffer injury, but is made by a double line of ropes which, in order the better to stand the weather are tarred every year. Inside of the enclosure are the summer stalls or stands for the cows. At the entrance of the stable and in front of every stall, there is a dung hole lined with stones, and having a channel for the fluid, and above it a well. This hole, for the sake of cleanliness, is covered with boards in which suitable openings are made, in order, by means of the draught of air, to promote the decomposition and fermentation of the dung.

There are two zebus, (male and female,) which were obtained direct from India, and which are kept here in Marienthal. These animals belong to the genus of horned cattle, and are of the height and size of a middling heifer. The horn of the male is round and has the color of wheat bread; while that of the female is flat, and of a bluish, ash gray color. It seems, these animals form in India two different varieties of the same kind, as in Hungary, for instance, the Mürzthal and Hungarian cows.

This species of horned cattle is distinguished, particularly, by its fleshy half-saddle which is found on their back at the root of the chine, above the two shoulder blades. The zebu, then, in a measure, is the camel of the cattle genus, an epithet to which it is well entitled, even on account of its tameness and playfulness. They are treated like the other cattle, except that during the winter, they leave the stall only on fine warm days, as they require a higher degree of warmth. Moreover, they are in perfectly good health, and the female zebu, having made a miscarriage the first time, is at present, for the second time, in the state of pregnancy. The next foaling will, therefore, disclose interesing data, as to the capacity of this animal for breeding and milk production. There were a pair of zebus formerly on this farm, which were rather larger; they did exceedingly well, they were continually in good health, until all of a sudden they died some few years ago. Previously to this the zebu bull was coupled with a Mürzthal cow. The little bull born in consequence by the latter was free from the oriental knob; in color and vivacity he resembled the father, though as to shape and height he was like his mother. It would have been interesting to make attempts at propagating this bastard kind, but, unfortunately, the young zebu had been castrated in consequence of gross inattention on the part of the herdsman. However, the oriental blood, thus condemned to the yoke, even in this low sphere acquired for itself the fame that it excels over its Mürzthal companions, by its speed and perseverance in drawing the yoke.

The draught cattle of the manor are supplied by this farm, and any deficiency is made up from the wild breeding flocks of Hungarian cattle. Among all the horned races of Europe there is none which, with an equally colossal frame approach so near the speed of the horse, as do the Hungarian oxen. It is a race of cattle, which, by dint of their high and stately growth, their long horns, (nearly six feet in length,) their proud and bold look, their broad breast and handsome white color, changing slightly into blue, and, lastly, the beautiful proportion of all their limbs, may fairly be pronounced to be one of the most useful and handsomest productions of generating nature.

The Mürzthal oxen, however, are considered on all hands as better fitted, under a proper climate for conveying heavy loads slowly and for moderate distances. From 1836-9, the murrain made its ravages in the regions of Alcsúth, and wrought terrible destruction; yet it never showed itself among the cattle of the manor, there being in such times the strictest seclusion maintained on the farms. It would be an utter impossibility for this sickness, if it should prevail in the neighborhood, to occur at Alcsúth; such is the cleanliness strictly followed here, such the abundance and uniformity of healthy food, such the constant employment of the cattle according to their strength. On the Kinza farm in 1838, a few head perished by the murrain, as some of the servants neglectful of their duties had come in contact with the infected region. The draught oxen, whose hoofs are worn out, are then shod.

There remains to be mentioned the Chinese pigs kept on the Kinza farm, which are raised principally with a view to serve as food to the laborers employed in mowing and cutting the grass. This species is well known in different parts of the country. It is of small size, its long belly rests on very short legs, its bones are tender, its color is a dark bluish gray, it increases very fast, is easily fattened, and its flesh grown over with fat, has a fine flavor. The Hungarian domestic breeds, moreover, are much larger and superior. In England a much valued new race of pigs has been produced by a crossbreed of the domestic with the Chinese pigs; still the original Hungarian race of pigs is far superior to the English and is much more like the Chinese. It is, therefore, very probable, that a coupling together of these two races would produce a happy result.

XXI.—*Description of an Apparatus for steaming food for cattle, with the estimate of the gain in feeding steamed chaff and fodder.*

If the nourishing particles contained in straw in its compact state, and which, especially on account of their great quantity, cannot be dissolved by the animal organs of digestion in the short space of digesting and ruminating, are prepared and rendered more digestible by being previously boiled or steamed, they will be found to give the cattle a much greater degree of nourishment.

Setting out from this undeniable position, there have been established at all the larger farms at Alcsúth well-constructed steam apparatus for steaming the cut straw before its being given to the cattle, i. e. for boiling it in hot steam, in order thereby to change it to a fodder at once more digestible and more nourishing.

The following is a description of the apparatus: (See Figs. 53. and 54.)

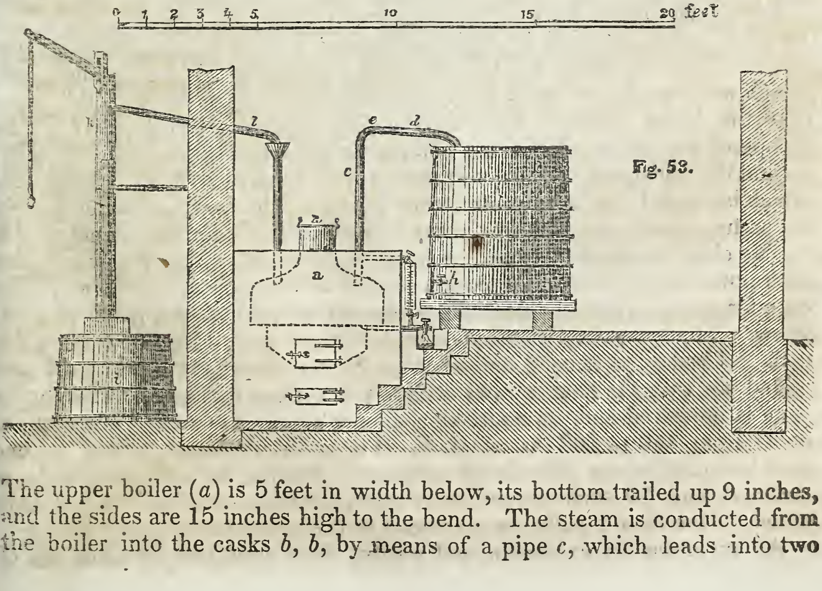
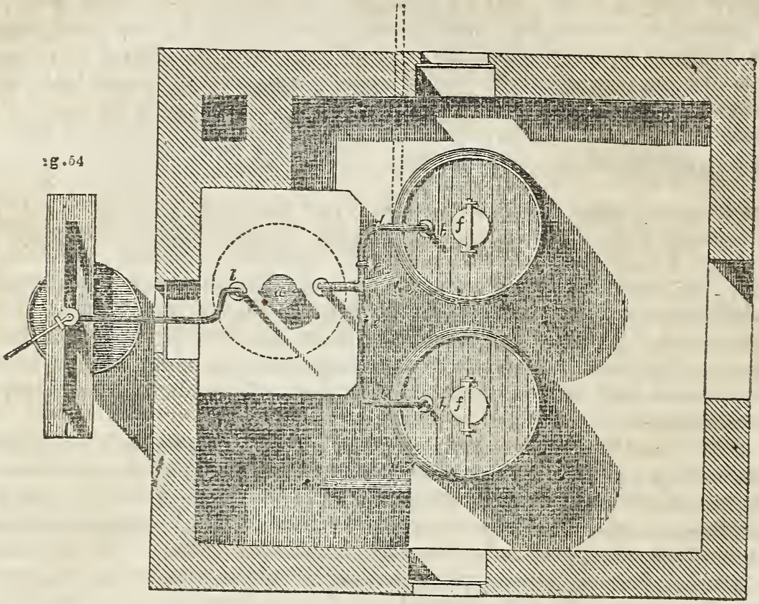


Fig. 53.

The upper boiler (*a*) is 5 feet in width below, its bottom trailed up 9 inches, and the sides are 15 inches high to the bend. The steam is conducted from the boiler into the casks *b*, *b*, by means of a pipe *c*, which leads into two arms, *d*, *a*, and which, by means of two stopcocks, *c*, *c*, give the steam an outlet into either of the vessels. The casks made of pine wood are in form of a cone; they are bound with hoops of iron, and are placed with their wider bottom upon stone sockets one and a half foot high. These casks are 7 feet high; their diameter is 7 feet 6 inches below, and 6 feet 10 inches above. In the top of the casks is a round opening of *f*, 15 inches in diameter, which serves to fill the casks with chaff from the loft above.

g.54



There is also on the lower side of the casks a square opening, *g*, by which the chaff when steamed is again taken out. To both the openings are covers of wood, which are trimmed with coarse cloth or strong linen, and which are fastened by wooden or iron cross rails, so as to keep the openings the better closed. The small copper pipes marked *h*, serve for the escape of the steam after it has completely penetrated the chaff. Finally, behind the boiler stands a wooden vessel *i*, which is placed in the earth, and which is loaded with beams; and from this vessel the water contained therein is conducted into the boiler by means of the pump *k*, and the funnel pipe *l*.

The chaff is steamed either by itself alone, or it is previously mingled with potatoes cut into small pieces; in this latter shape it is used as fodder only for cattle. The chaff is to be one-half wheat and the other half oat straw. For horses and sheep it is cut half an inch long, for cattle a full inch. The hay of second and third qualities is likewise cut into chaff and mixed up with the chaff straw; it is put into the steam casks, whereby its aste is improved and its nourishing power much enhanced. A steam vat holds from 750 to 800 lbs. of chaff. For cattle, there are mixed to one barrel of chaff three bushels of potatoes. Within an hour the whole is steamed, and 30 such decoctions require, for firing, one-half cord of hard wood. One man is sufficient to attend to the apparatus.

An apparatus so extensive and costly, to be sure, can be made use of only where there is a large consumption of chaff fodder; but, on the other hand, it will unquestionably give rise to a very material change in the system of supporting domestic animals. Although it is plain, at the very outset, that these fodder arrangements are sure to give their projector a great profit; yet there is another question to be settled beforehand, namely, how will the health and breed of cattle, in the course of time, ultimately be affected by this system of feeding? It is evident no decision as to the general introduction of chaff feeding for the whole stock of the manor can be arrived at except by a very careful examination and consideration of the subject, and by previously submitting it to the test of experience. This trial was made, and it was found to succeed well; the system was generally introduced in 1839, and two years thereafter the measures taken by the director of Alcsúth were fully justified by their good success. For the animals fed chiefly with steamed chaff, continue in excellent health and condition; and the liveliness which the cattle show, both in the stall and in the yoke, is a clear proof that the food answers in the most perfect manner all the requirements of the animal organism, both of cattle for draught and breeding cattle.

The following, which is drawn from official papers and books, and which refers to the winter of 1839–'40, will show that this system ensures a considerable saving:

A.

Expenses for profit on 2000 *old wethers, for* 120 *days.*—For 100 wethers the daily winter fodder was formerly estimated at one metzen* of potatoes, and for each wether 2 lbs. of hay and 1 lb. of straw for picking. In the case of steamed food, on the other hand, 100 wethers receive daily only 1 metzen of potatoes, and each wether besides, one-half pound of hay and 1 1-2 lb. of steamed chaff, consequently each receives 1 1-2 lb. less of hay, and 1 1-2 lb. more of straw. This, at the present prices of hay and straw, the former being 2 florins 30 kreutzers† a cwt., and the latter 25 kr. a cwt., makes the saving of the 30 cwt. less of the former amount to 75 florins, and the excess of 30 cwt. of the latter to 12 florins 30 kreutzers; so that with the entire stock of 2000 wethers there is a daily saving of 62 florins 30 kreutzers—equal to $12 50.

B.

On 208 *draught oxen, for* 108 *days.*—Formerly the usual daily quantum of winter-fodder of full grown cattle was half a metzen of potatoes, 20 lbs. of hay and 5 lbs. of straw. At present a full grown ox receives daily one-eighth metzen of potatoes, 5 lbs. of superior hay in its raw state, also 5 lbs. of inferior quality cut to chaff and boiled, lastly 20 lbs. of steamed chaff. Accordingly, at present an ox receives less daily one-eighth metzen of potatoes and 10 lbs. of hay; and, on the other hand, receives 15 lbs. more of straw a day. This makes for 208 head a daily saving of 26 metzen of potatoes and of 2080 lbs. of hay, which is 78 fl. a day; if we deduct from this the daily greater cost of 3120 lbs. of straw at 25 kr., there remains a clear daily profit

fl. 78
" 13
fl. 65 = $13

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* A Pressburg metzen is equal to 1 3-4 English bushel.

† One florin, Vienna currency is equal to 20 cents; one florin is 60 kreutzers.

C.

On 34 *studs, for* 180 *days.*—During the winter season a horse formerly received daily 13 half metzen of oats, 10 lbs. of hay, and 2 lbs. of straw; at present however he receives 10 half metzen of oats, 5 lbs. of hay, and 6 lbs. of chaff, which for 34 horses gives a daily saving of 7 fl. 5 kr. or about $1 42 cts. The entire saving of fodder being thus for the whole stock daily, in Vienna currency, 134 fl., 35 kr. equal to $26 87, amounts for 180 winter days:

A. with 2000 wethers at 62 fl. 30 kr. a day	to	7,500 florins.
B. with 208 head of cattle, at 75 fl. a day	"	11,700 "
C. with 34 studs, at 7 fl. 5 kr. a day	"	1,275 "
	Total	20,475 fl. or $4,095.

In conclusion we will note here the entire cost of the steaming apparatus described above, and which is calculated to steam daily 600 metzen of fodder. Cost with a copper boiler of 250 lbs. weight, including the cost of putting it up, 428 fl. 40 cr. Vienna currency, or $85 68.

To give an idea of the great attention paid in Alcsúth to the production of fodder, we will simply state, in what the stock of fodder consisted on Nov. 1st of the sterile year of 1839, when the whole country was suffering from the scarcity of fodder. There was then—

Of red beets	1,882	metzen.
" potatoes	12,941	"
" lucerne	4,860	cwt.
" clover	3,920	"
" esparsette or sainfoin	21,360	"
" hay 1st class	2,360	"
" do 2d "	6,946	"
" do 3d "	1,613	"
" oats and vetches mingled	6,013	"
" oats	1,470	"
" mixed fodder	4,637	"
" carrots	1,793	"
" winter straw	12,836	"
" summer straw	4,706	"
" sheaves of oats half threshed	2,584	"
" oats	nearly 7,000	metzen

The above quantities of fodder were sufficient to winter 10,264 sheep, 70 horses, and 136 head of cattle, besides leaving a considerable supply of fodder for the winter of 1840–'41. In June, 1840, when the scarcity of fodder had reached its height in Hungary, the committee of the Hungarian Society of Farmers found the barns and thrashing floors of Alcsúth better supplied with stocks of fodder, than the largest farms used to be at the setting in of winter. The committee took this as the best evidence of the fact that, at Alcsúth farming is carried on upon rational principles, in such a manner as to have sufficient provision made in the out-set, even for the worst of harvests. It is only by such precaution and circumspection that the farmer, especially he who devotes his chief attention to breeding of cattle, can ensure good success, and the highest average profits.

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APPENDIX No. 2.

REPORTS RELATING TO THE CROPS, &c.

CHARLESTOWN, November 1, 1847.

Dear Sir: I transmit to you the following brief report of the agriculture of this region. I also enclose one that I wrote last year, but did not transmit, having heard that no appropriation was made for a report on the subject. The reason of my sending it is, the remarks and facts contained therein relative to the potato rot, a subject that has by no means yet lost its interest.

The spring was unusually backward, the snow lying on the ground till nearly the end of April, so that the ground was not in a fit state for planting till two weeks later than is common, and even till the summer solstice: the nights were more than usually cool, as a whole, though there were none of the severe late frosts that sometimes occur. July was very hot and rather dry—so much so, indeed, that on ridges and knolls of light warm soil the growth of the tubers of the potato was wholly stopped and they sprouted anew when the rain came again in abundance, which it did in the very last of the month. With the exception of a few days, August was unusually cool and damp, as also September and October, although severe frosts, in the latter part of the time, were unusually delayed. The first week of September was very hot and at the same time damp.

Notwithstanding the lateness of the beginning of farming operations, on the first of August, the various kinds of produce had reached the usual degree of maturity of that time. Afterwards their progress to perfection was slow and their full maturity, in some instances, incomplete.

The crop of hay was good, and extremely well cured, in both quantity and quality, rather above an average.

Hops, of which the cultivation has been increasing in this region, yielded a good crop.

The crop of apples was small and the fruit rather deficient in flavor.

Beans produced well, but their ripening was imperfect, and it is probable, that when they come to be threshed, the crop will not be found large.

Pumpkins were small and imperfectly ripened. This, also, was the case with squashes. Melons ripened imperfectly and were singularly wanting in flavor.

Oats gave a good crop. Rye also, but wheat yielded poorly. It was in many places considerably injured by the weevil. The crop of corn was very good, but from imperfect ripening there was more of soft than usual, and in some instances it moulded in the stalks from the dampness of the weather.

Garden fruits, as plums, pears, gave but a light yield. Grapes of hardy kinds yielded abundantly, but their ripening was slow, and there was a want of sweetness in the later kinds.

The crop of potatoes wore a very promising appearance, on the whole, till the warm, sultry week in the beginning of September. The central black spot in the leaves, the beginning of the disease, then made its appearance precisely as it had done in similar weather in the two preceding years, (see last year's report accompanying this,) and in a week the tubers began to be affected, probably from one-third to one-half of the crop was destroyed.

Mr. Smee has published a work in which he attributes the disease to the ravages of a species of aphis, which he calls the *aphis vastator*. I carefully examined the plants in my garden for the express purpose of discovering this aphis, but found very few of them at the time the disease first showed itself—not more than may be found at any time, and could discover nothing that would induce me to coincide with his conclusions. From the peculiar and similar state of the weather at each time that the disease has made its appearance, it seems most likely that its origin is owing to atmospheric distemperature, and that if aphides should make their appearance, they are more likely to be the attendants than the authors of the calamity. The character of the seed does not seem to be the cause, as I planted about the middle of June, a few hills of potatoes, just then received from New Zealand, where the disease has never made its appearance, yet the plants were attacked simultaneously with the others, and as badly. The long red potatoes, called here the long-johns, (I think the same as the mercers,) seemed to suffer the least.

Very respectfully, yours,
SAMUEL WEBBER.

REMARKS ON POTATO DISEASE IN 1846.

In the early part of the summer the potato crop was very promising; the vines were thrifty and the bloom early, and potatoes fit for the table came into use about the middle of July. On the 24th of July, I first noticed a change in the appearance of the vine. What first attracted my attention was a blackish spot, about the size of a finger nail, in the centre of many of the leaves. Upon examination this spot appeared to be dead, and was covered on the under side with mildew. At this time the weather, for about a week, was very warm, sultry and damp, with frequent showers, and for a considerable part of the time, cloudy. The stem of the potato was, at this time, perfectly sound, as far as I could perceive, and I examined them very carefully. The black spot increased rapidly in size day by day, and continually showed itself in leaves before sound, till by the fifth of August most of the leaves were decayed and dry.

From the time the spot made its appearance, I dug every day two or three hills of potatoes for use, and purposely selected some of those in which the leaves were most affected. On the fifth of August, I for the first time, noticed symptoms of decay in the tubers. In a hill I then dug, there were found two potatoes very obviously and considerably unsound, and two or three more were found on preparing them for the table. The skin did not appear to be affected, but the substance beneath it was in spots, soft and semi-fluid, apparently to the depth of a quarter of an inch. One being cut open and examined with a microscope, the decayed part seemed like a mass of soft starch—the cellular texture seemed to be destroyed and the starch globules loosened. The other potato was laid on a shelf, and after a few hours, a yellowish water was found to have oozed through the skin, and stood in drops upon the surface. As the dirt stuck somewhat tenaciously to the potato when first raised from the ground, some exudation had probably taken place previously. Some days afterwards I noticed a fungus growth on the outside, and this I attributed to the seeds of the fungus having found a fitting nutriment in the watery fluid thus exuding from the skin, and mixing with and moistening the earth. From the time I first observed the decay, I continued to find one or two, sometimes three or four rotten tubers in every hill, but the number did not increase, though the stalks gradually withered, and by the 20th of August, became entirely dry and sapless. The weather, after the 1st of August, was very dry and warm, and by the 6th or 7th, the earth around the potatoes in the hill became dry, and to this probably may be attributed the non-appearance of the decay in potatoes not then affected, though it did not cease in those already attacked, but continued till the whole tuber was entirely destroyed, so that when the crop was finally harvested, in the latter part of September, only a dry spongy husk or skin was found in its place, in close contact often with, and even adhering to perfectly sound potatoes.

I had an opportunity or two in the course of the season, and before the blight began, of witnessing the effect of the attack of worms upon the stem, having found one or two where the pith was completely eaten out of more than half the length of the stem, by a yellowish worm about an inch long. In this case the leaves were not spotted, but the whole of them and the top of the stem drooped languidly, like those of a newly transplanted plant, and would probably have gradually withered and died, had I not broken in upon the process by cutting the stem off, in order to seek for the cause of its beginning.

At the same time with the first appearance of the blight upon the potato, a similar one came upon the newly formed and partly grown berries of two kinds of foreign grapes which I cultivate—the purple and the white Frontignac—and completely destroyed the crop. The bunches became entirely mildewed and gradually turning black.

These observations seem to confirm the opinion which assigns as the cause of the potato rot, some atmospheric influence, giving disease to the plant, causing an exudation of sap and destruction of the cellular texture, first in the leaf and then in the tuber, favored by moisture with warmth, while the mildew and the fungus are only sequences of this state.

Respectfully yours, SAMUEL WEBBER.

Charlestown, N. H., Oct. 20, 1846.

LETTER OF WILLIAM BACON, ESQ.

HON. EDMUND BURKE :—

Dear Sir: Your circular calling for agricultural statistics for the current year, was duly received, and would have been answered sooner had it not been for a delay in order that I might furnish myself with facts necessary to make my notice more perfect.

I remark, first, upon the season. The winter of 1846-'7 set in early in December, and gave us cold until nearly the last of that month, when "a warm time" set in which continued with the exception of a few days, made cooler by a change of wind, until January 20. Consequently most of our snow went off, and the frost to some extent broke up, and a considerable surface freezing and thawing was the consequence. The latter part of January, winter again opened its rigors and continued unabated until April. The cold was in no instance, so severe as is usually the case in northern winters, as indicated by the thermometer, which I think in no instance marked more than 8° below 0, and this but once.

Spring came on gradually. The snow, of which we had a large body, went off principally by the agency of the sun, while cold northerly winds kept the air chilly with their unbroken influence. The earth was unfit for agricultural operations until nearly or quite May, consequently but little ploughing or sowing was done, until that month came in. May was cool and rather dry for grass, the ground after rains, being swept by high cold winds which not only dried the surface, but left it hard and impermeable, so that future rains failed in their effects.

Consequently, the light rains of the early part of June had but little influence upon grass and winter grains, but more abundant showers commenced falling about the 20th, and were followed by a favorable atmosphere, and grass lands immediately presented an improved appearance. July was favorable to the growth of grass and small grains, though the season for their full maturity had so far passed as to destroy hopes of a full hay crop. Towards the close of the month the atmosphere became sultry, filled with frequent morning fogs, and the cry of "potato rot" again began to be heard from localities favorable to its existence. A change to a cooler atmosphere in August, however, seemed to stop its progress, and we hear no more of it until the middle of September.

Autumn commenced, and indeed has passed, with fine weather for our climate. There was not frost enough to do any injury until October, when every thing was out of its reach; though a few days in September were so threatening in indications that much corn was cut and stacked to prevent injury from its effects. From the 21st of September a warm turn came on, with frequent fogs which continued until near the middle of October, when a heavy rain was followed by freezing weather, so cold as to affect potatoes in the ground. The last of October and November, up to this time, November 19, has been fine. On the morning of the 13, the first snow of the season appeared, in quantity just sufficient to whiten the roofs of buildings and give the mountains a wintry appearance, but when the sun came up it withered away.

I have thus briefly run over the past season, rather as an explanation to the remarks that follow than for any other object, and will now proceed to the subjects matter of the circular, and here I may remark, that in many things the produce fell short in 1845, and they have also done so in 1847. They cannot either of them, be considered average years, for grass especially, fell far short this year from the crop of '46 and in '45 it was much less than in previous years.

The wheat crop.—In 1847, there was probably nearly or quite double the quantity of land sown, when compared with '45. This was, for the most part spring wheat, of which almost every farmer sowed a little. The principal cause, probably, was the high price of flour, which farmers have become too much in the habit of buying. The quantity of seed sown per acre, depends on the variety of wheat. Of the *black sea* variety, that now mostly cultivated, from a bushel to five pecks of seed, as the strength of the land will admit. Of other kinds, such as Siberian, &c., two bushels of seed is considered a fair medium quantity. Of the black sea wheat, the product per acre varies from fifteen to twenty bushels of sixty pounds to the bushel per acre; the average quantity, however, will not probably go over eighteen bushels. Other varieties less, say from ten to, in best crops, twenty bushels, average fifteen bushels. Time of sowing as early in spring as the season will admit. In 1847, from twenty-fifth of April, to tenth of May, though but very little sown in April, and that in the earliest soils. Time of harvest, from August first to the tenth. Wheat is worth $1 50 per bushel, but no more raised than consumed here. The kinds most successful are the black sea (which is most free from disease and the attacks of insect, and does not require so strong a soil, will give as many bushels per acre as winter rye on the same soil, with the same management;) the sea wheat, Siberian wheat, the last possessing more of the qualities of winter wheat. The success in raising wheat is such, as should induce every farmer to raise his family supply. Though the crop may not have been an average the past season, the success has been such as to warrant a continuance in sowing. A gain of seventy per cent. in quantity, may be estimated from 1845.

Barley.—In this there has probably been a gain of fifteen per cent. Farmers are finding it valuable for feeding all kinds of domestic animals, more certain than corn or potatoes and less draining to the soil than oats The quantity of seed used, varies from two to three bushels per acre. Produce from thirty to forty bushels per acre, worth from sixty-two and a half to seventy-five cents per bushel. None raised for foreign market. Sown as early as the season will admit, and harvested in July. It will do well on any feasible plough land. This and the wheat crop are the two best for stocking after.

Oats.—No essential variation perhaps in the quantity of land sown. If any thing an increase, may be it would be safe to say of ten or fifteen per cent. The price last spring was high, and grass lands were killed out in many places, in consequence of which, they were in some instances turned over and sown to this crop in which, had the grass looked more favorable, it would have remained in sod. The quantity of seed sown varies with different farmers, on different soils, and in different localities, to from two to three bushels per acre. Our best farmers now sow the latter quantity, but for an average, two and a half bushels would probably be a fair estimate. The quantity harvested of course is various. Some remarkable good crops have reached eighty bushels, but these are very rare. Taking all the varieties of soil sown, and other things attending the crop such as time of sowing, &c., thirty-five bushels will probably be a fair estimate. The time of sowing varies from the first opening of the season (this year from the twenty-fifth of April to May the twentieth.). They are a crop that the farmer puts in at his convenience, though those earliest sown give the heaviest grain, and are less liable to attacks of rust on the straw, which almost invariably attends those late sown, and cause the grain to fill badly, from blight. The time of harvest extends from August the first unto September. The average per cent. consumed by the farmer is probably about thirty-three. The surplus mostly sent to the Boston market. Present price *at home*, forty-five cents per bushel.

Rye.—This crop being liable to winter or spring kill, is just going out of fashion. There has probably been a falling off from 1845 of thirty per cent.; cause, its liability to kill out. The quantity of seed sown, five pecks per acre; twelve, at most fifteen bushels per acre is the average produced. Price eighty cents per bushel. All consumed at home. Sowing should be performed as early as the middle of August, unless the ground is in a high state of cultivation, or the soil very warm and quick, when it may be deferred to the tenth of September. Mostly harvested in July.

Buckwheat.—In this crop there has probably been an increase over that of '45 in land sown of one hundred per cent., for the causes, that the potato has become an uncertain crop; that the lateness and coldness of the season led to fears that the corn crop would be short, and the excellency of the crop in subduing tough and unmanageable soils, and its tendency to eradicate foul and noxious weeds. Buckwheat is considered a noble warrior for contending with the Canada thistle, which has for years been pushing its conquests in many parts of the northern states. An enterprising farmer has recently informed me that three years since he had a field completely overgrown with this vile plant, which flowers in spring, and again at sowing time, early in June. His first crop of buckwheat more than paid for the labor twice over, and a diminution of thistles was very evident at harvesting. The next season he gave two ploughings as before, which kept those whose roots yet remained, in the back ground, and in autumn he harvested, a still better crop of buckwheat, while he saw his thistles rapidly running out. This year he has pursued the same course of two ploughings and sowing, and had the best crop of the three years. He said, that at the last harvesting, he did not believe that a dozen thistles could be found in the field. The rationale of the matter is this, the two spring ploughings kept the thistles back, and the growth of the buckwheat is so rapid, that it shades the land before they can overcome their stinted condition, and they have no territory to grow in, and no sunshine to aid their growth, so they must die. The usual quantity of seed sown is a bushel per acre, but in using this quantity it must be remembered, that the more barren lands are usually taken for this crop. In strong lands, such as are adapted to corn, &c., a less quantity must be used, else with its branching propensities it will grow so thick as not to seed well. Twenty-eight bushels per acre is as near an average yield for the present, as we are able from the facts before us to estimate. It has sold readily this fall at home, at fifty cents per bushel. Twenty-five per cent. of the amount raised is consumed by the farmer who raises and purchases in his vicinity. Sown from the fifth to the twentieth of June. Harvested in September. Sown mostly on poor soils, but occasionally after a failure of other crops on a good one.

Indian Corn.—This valuable crop, which makes the farmer's fields look so rich at harvest-time, lays such a solid foundation to his pork, contributes so essentially towards furnishing a supply of warm dough-nuts, and loads his table with such healthful and delicious puddings, has we are happy to say, notwithstanding the unpromising attitude of spring, received increased attention the last season. The increased quantity over 1845, is full thirty-three per cent., for the simple reasons that some farmers, who for some years thought it cheaper to buy than raise their supply, were taught by last year's prices, that buying was not so cheap after all, and others who had been in the habit of raising were sure that it was doing so well that it was best to try to raise more. The coldness of the early part of the season, had a tendency to retard its growth, but Yankee corn will grow in spite of high chilly winds, provided jack-frost keeps his fingers off. Then the cut-worm lays lurking in sward lands with famished appetite, and he came to take toll before it was ready for the mill. But after all the influence of cold and the destruction of worms, the crop has been a good one, and an unusual number of pieces were entered for premiums, many of which were estimated at one hundred (some more) bushels per acre. Such crops, however, are easier imagined than raised, and the half-bushel too often exposes the frailty of human judgment. That such crops are sometimes raised, we will not doubt; but we aver that *seventy-five* bushels of shelled corn an acre, is a *great* yield, and we think thirty-five a full average for western Massachusetts. New corn, though it can hardly be said to have become merchantable, is selling readily at seventy-five cents per bushel. The spring price varied from $1 00 to $1 10, but we can hardly be expected to reach so high this year. One third is probably consumed in the region where raised. The remainder is mostly sent to Boston market for shipping. Time of planting in 1847 from May 5th to the 25th, and mostly harvested in September. Almost every kind of Indian corn is raised which will adapt itself to the short summers of the north, but the prevailing one is an eight rowed one of a hard and flinty character, which gives good weight of grain and furnishes a sweet rich meal. The corn of the last season was mostly cut up by the ground through fear of early frosts, a process which tends to increase the value of the stalks for fodder without injury to the corn, provided it is rightly managed. But the kernel (the part for which the crop is more particularly raised) should be pretty thoroughly hardened before the process takes place, or the weight will be light and the meal unsavory.

When the corn is bound in bundles, and stacked in this process of *cutting up* the storms penetrate the middle of the bundle, and the fodder and the ear, are both liable to sour and mould, while the labor of gathering becomes heavy and disagreeable from the weight of the bundles. A much better way of doing up the thing is coming in practice, which is to cut up some four or five hills and set them around a standing one very loosely, tie the tops to the standing one with a wisp of straw, to prevent their falling or being blown over by the wind. The storm and the wind will readily pass through these stacks, and if one wets, the other will dry. At harvesting, it is only to cut the standing hill, and throw the bundle on the cart, a process easily and rapidly performed.

Potatoes.—Notwithstanding the ravages of the disease which has prevailed so universally for a few seasons past, farmers have held up very good courage with regard to this valuable esculent, yet there has probably been a falling off in the quantity of land planted, of about thirty-three per cent., merely in consequence of the dread anticipation of the disease. The average quantity of seed is probably twenty bushels per acre, some planting as low as fifteen and others in a few cases going as high as thirty bushels. It would be very difficult the present year to give an average produce per acre. Sixty bushels has been considered a good crop, and from that quantity they produced fewer sound ones, until you came to fields so badly infected that they were not dug. But few persons have them for market, but the few sold, have brought from fifty to sixty cents. The average amount consumed where raised, is as great as seventy-five per cent. They were planted last spring through the month of May, and harvested from September 15th to October 20. The kinds most successful here were those provincially called long-johns, a long rather coarse red potato; the orange, so named from its form, and the peach-blow, also a red potato. The early kinds, such as the kidney, whose stalks matured before the plague fell upon them, were not, in any instance that I have heard of, at all affected. The mercers and carters, two favorite varieties, suffered most. In dry and porous soils they have usually succeeded best, though in deep and mucky lands which have been thoroughly drained, they have this year done remarkably well. We have seen carters raised on land of the latter description, as fine as the imagination could desire.

With regard to diseases, they have been subject to none that we know of, except the modern plague, "the rot," which in consequence of the coolness of the season and frequent rains, we hoped they would escape, and no complaint was made of its appearance until a turn of warm weather in August, attended with a damp foggy atmosphere. But very few instances, and those of but slight infection occurred at that time. When the air became purer, and free from these visitations of fogs, the progress of the rot appeared to stop, at least we heard no more of it until near the close of September, during which time farmers were beginning to console themselves with the hope that the evil was passing away. But it returned with greater power than ever, and its first and most fatal effect was upon the carters and mercers. Early in October it was supposed that owing to the lateness of the season, three-fourths of the crop might be saved, but at least that proportion was entirely lost, or so much infected as to unfit them for culinary purposes. In some instances they were so bad that farmers gave up digging, while in very many, after a hard day's work they found themselves rewarded with but little more than enough, after the labor of raising, use of land, &c. to pay them the wages of day laborers. The atmosphere was subject to frequent fogs, at the time of its second appearance. The commencement and progress of the disease was marked with somewhat different appearances, than those formerly witnessed. The leaf turned yellow and fell off, nearly simultaneously with the attack of the rust upon the vine, and in some instances in advance of it. The rapid progress of rot in the tuber was not the immediate result as formerly. The plague spot was seen under the cuticle spreading its poisonous influence as before, and often extended itself until it enveloped the whole potato. This portion of them, if they were placed on a dry floor or even a dry, cool cellar, shrunk away and became a hard valueless substance. If they were put in warm cellars, inclining to moisture, they rotted and that was the end of them. Their freedom from putrid nauseous rot, while remaining in the ground we attribute mainly to the lateness of the reason, and the coolness which it naturally produced.

With regard to the origin of the disease, our early opinion is more fully confirmed by each year's observation, that it arises from a peculiar state of the atmosphere, and is more or less virulent from predisposing causes in the plant, arising from the soil in which it is raised, and the method of cultivation attending its growth. That its first symptoms appear in the vine, in the form of a rust or blight, somewhat similar to that which often fastens upon the wheat stalk, we believe is a fact more generally acknowledged every year. That this rust checks the free circulation of juices taken up by the roots, and carried into the top for elaboration, where portions unnecessary or injurious to the health and growth of the tuber may be given to the winds and allows them to return and feed it with their poison, which results in its decay, we think a reasonable inference. Wherever the vines grow luxuriantly the disease is almost certain to make an early attack; fermenting manures, also, appear to aid its progress; compact soils, or those liable to become so, after heavy rains, are wholly unfit for the crop, with its present liabilities to disease.

Many preventives have been tried. Among those said to be most successful, it seems from all accounts that light lands are in the first place to be selected for the potato. Hence, in deep sandy soils they have been found to be uniformly better, through the several years the rot has prevailed, than in any other. The few instances where they have been planted the present year, on deep muck lands, *well drained*, gives us encouragement to hope that they will uniformly succeed in such lands, which all who have observed them must know are exceedingly light and pliable in their texture. But of this we cannot yet speak positively. They may have failed on similar lands in other localities. Sowing lime on the land after planting, and hoeing is said, in several instances, to have had a good effect, while putting lime and lime ashes in the hill, have failed of beneficial results. Spreading charcoal, coal dust, liberally on the surface, in like manner, is said to have been an almost infallible safeguard. These two substances are well known to possess excellent anti-putrescent qualities, but if the disease originates in the roots or tuber, why not place them there? The experiment of doing so, has been tried, and as far as *we have heard*, has failed in every instance, while, when they have been spread on the surface, and kept in continual contact with the atmosphere, a good effect has resulted. Mowing the tops before the disease strikes them has also saved many, but it is objectionable to some because it stops their growth. It must be done in order to succeed *well*, before they become infected. We, last spring, in our own experiment, omitted manuring on half of our field, while on the other half it was spread on and harrowed in. The rows were then struck out by ploughing furrows, about six inches deep, and the crop was planted on the bottom of the furrow. Where we did not manure, ours were very from rot; where the manure was spread, three out of five were infected. In a corner of the field where the soil was what, in Yankee phrase, is often designated as "clammy"—a stiff, unyielding soil and very retentive of moisture—nearly all were worthless, while in another corner of black muck land, they were uniformly large and good.

It is the hope and expectation that perseverance will go forward in her work until the cause of this disease, and palliatives, if not perfect remedies may be found adapted to every soil and locality. It is surely a great calamity, thus to have one of our most valuable and healthful products cut off year after year. But lamenting the misfortune can be of no avail, and the idea that it will result in the annihilation of the article, seems almost an unnecessary absurdity. It *may do* so to be sure, and yet it is quite as probable that something *may* be sought out and done, that will restore it very nearly or quite to its former productiveness. He who first accomplishes this, will be a benefactor to the world.

In many localities the hay crop has come in very light, especially on uplands. This is attributed by some to the ice that formed on the surface, after a general thaw in January. If so, why were not its effects seen on intervals where the formation was more general?

It may have originated in the grounds freezing suddenly when full of water, thereby injuring the roots, but we attribute it mainly to the circumstance, that our snow in spring went off slowly, and that the water and the earth were kept cold by piercing wind, and that being subject for a long time to the drenching of this cold water, it was destroyed. The grass crop of 1845 was unusually light; that of the present year was probably about as much so. In both years, there was a falling off of the usual quantity of at least one-fourth, as a whole, on many farms one-half, while on others, a medium crop was harvested. The quantity for the present year will not probably average more than a ton and one-fourth per acre. In some meadows, it was not more than five hundred, where good crops were given last year. From this small quantity it will range to two and a half tons per acre.

Hemp and flax.—None of the former raised. I find, on reference to the statistics of the several branches of industry, published by the state in 1845, that the quantity of flax raised in Berkshire in 1844 was only four thousand, one hundred and eighty-nine pounds. We venture to estimate an increase on that quantity of ten per cent.

Tobacco.—We are quite too far north to make a business of raising this article, though we have many thorough-going consumers. More is raised now however than formerly, as more choose to raise their own. We anticipate a gain of thirty-three per cent., and put the quantity for Berkshire at three hundred pounds.

Silk.—Probably not so much raised in Western Massachusetts as in 1845, by one-half, quantity very small.

Sugar manufactured from the *maple.*—The increasing demands for wood, a considerable quantity of which is necessary in producing the article, has a tendency to check its manufacture; though the quantity made this year, over that of 1845, we think has increased about five per cent. The amount manufactured in our county, we think, will not fall short of 260,000 pounds, some of which, for fineness of grain and color, and richness of flavor, will entitle it to rank with the best muscovado.

"*The probable proportion of cultivated to uncultivated lands.*"—The inquiry of course includes wood lands among uncultivated. Doing so, and stopping there, we should say that three-fourths of our mountain region was under cultivation, and one-fourth in wood.

"*Most approved rotation of crops.*"—Different farmers have different opinions, and different soils require different management. For ourselves, we would plant, and follow with a wheat crop, to be succeeded with grass, herds and red top for three or four years. Some prefer oats after corn, and before stocking. Others, barley, oats and peas. Many turn over sward land in the fall or spring, sow oats two seasons, and stock. Others sow barley on the inverted sod, and stock; and so on, almost every farmer having his own favorite way.

Root crops.—We have spoken on potatoes. The sugar beet is raised by some, and much approved, as is also the carrot. Of each of these, from five to six hundred bushels per acre, or in that proportion, would probably be a fair yield, though they sometimes go as high as eight hundred bushels. These crops are usually raised in small patches, however, and so large a field as an acre is rarely seen. Turnips may be estimated at five hundred bushels per acre, under very favorable circumstances.

Peas usually give about twenty, and from that to twenty-five bushels per acre; are considered a profitable crop for feeding swine. Beans, for the most part, are raised among corn, and most farmers raise them in that way. Of course, no fair estimate of what an acre would produce if planted to them alone, can be given.

The orchard.—Increasing attention is being given to all kind of fruit, apple in particular, of which many new orchards are in the process of being set. Pears and plumbs are receiving considerable attention, as are also cherries. Peaches and grapes are beginning to ripen in a few gardens in different sections of the county, and "promise to pay" the rent of soil and labor of cultivation, with their rich and healthy products. Strawberries are but seldom cultivated, but grow plentifully in old, exhausted meadows. It is the farmer's economy to take this plant under his protecting care, as he values its excellence. The labor of raising them in the garden will occupy no more time than going to the field to gather them; and if he does raise them he is sure to have them; but how often is he disappointed and vexed, on going to his field, to find that some fugitive recreant has anticipated his arrival, and borne away the harvest. And besides, meadows are the place for grass, and not for berries.

Dairy.—There is an increase of the quantity of butter and cheese manufactured from 1845. The low price of wool for the last year is a probable cause. We have now good facilities for getting our butter and cheese to Boston or New York markets, and they will probably hereafter meet with more attention. Good butter has sold through the season, up to October 1, for sixteen cents and two-thirds a pound. It is now worth from twenty to twenty-two.

In the matter of raising *horses* and *cattle*, there is probably but little variation for the last two years. It has been the practice of our dairymen to kill their calves when young, or hand them over to the butcher as soon as he would accept them, to a very great extent, in order to save as much milk as possible. But the present high prices of cattle leads us to suppose that there will be more raised for a while than has been usual. So too with horses. Beef is worth from five to six dollars per hundred when killed. Hides five and a half cents per pound.

Sheep, a decline of numbers, though not a great diminution. The average weight of fleece is thought by competent judges, and "by comparing notes," to be three pounds. The price has ranged from thirty to fifty-five cents per pound. The average may be set at forty cents. Mutton is worth four, five, six cents per pound. Skins from thirty-seven and a half to sixty-two and a half, and extra large seventy-five cents apiece.

Hogs about the usual number. Average weight two hundred and fifty pounds; price per pound, by the hundred, from seven to seven and a half cents.

Poultry and eggs.—Poultry is receiving more attention every year; and well it may, especially hens, for there is no animal that yields greater profit in proportion to first cost and expense of keeping than poor biddy. Well managed, she will pay for herself half a dozen times over in a year—have a plenty of time to rest, and, if you are not watchful over her education, some to do mischief. When worn down with age, her carcase will always, with a little care, sell for more than first cost, to be placed under the dissecting knife of the epicure. *Eggs* have been worth twelve and a half cents a dozen through the season, and are now selling for sixteen cents.

Bees.—The last two seasons have been unusually fatal to many hives, insomuch, that many stocks have run out and nearly all been so much reduced that at the present time there are not so many, by one-third, as there were in the fall of 1845. The cause is probably owing to the fact, that many hives commenced those winters with too weak populations, and that they perished from being left in locations too much exposed to the severities of our frowning climate. In all the hives where they so died, so far as we have heard, they left ample supplies of honey for their winter subsistence. It is a fact, that cannot be too widely disseminated, that bees should be well protected from storms and from high and searching winds. In a *northern* climate, put them, when the weather begins to be cold and boisterous, into a tight dry building. If it is dark, so much the better; if cold, no matter, provided the hives are ventilated. If they are disposed to come out on a warm day, throw a blanket over them to make it darker. The average amount of honey in common hives will not vary much from forty pounds. Fine honey has sold for twelve and a half cents per pound, box honey, twenty to twenty-five cents per pound.

Manures.—Farmers are every year becoming more economical in the saving and application of manures, which is a great improvement. They are also seeking out new resources for their increase. Of course, every thing that tends to increase its value is deposited in the manure heap. In addition to this, much turf from the way side and much from the swamp, is yearly made into compost and forms an admirable dressing for grass land. An intelligent farmer, whose mind is always on the look out for something to enrich his fields, informs me that he has made, what to him is a valuable discovery, in the following preparation, viz: he saves all his hen manure with the greatest care, through the year; in the spring, he takes it, when thoroughly dry, and with a common flail reduces it to powder, after which he adds an equal quantity of gypsum and another equal part of ashes, (making a third of each,) and incorporates them well together. This preparation he applies to his corn, by putting half a pint in a hill, and he assures me, that this small quantity will produce as good an effect, as a shovel full of well rotted barn yard manure.

Wages of labor.—Farm laborers command ten, eleven and twelve dollars per month, through the year. In the summer six months', men, from twelve to fifteen dollars. Day laborers, at haying and harvest, from one dollar to one dollar and twenty-five cents, at other farm work, from sixty-two and a half to seventy-five cents. In winter, by the month, from eight to ten dollars. By the day, fifty to sixty-two and a half cents, though but few farmers hire in winter unless it be for chopping by the cord. Mechanics, from a dollar to a dollar and fifty cents per day, or from eighteen to thirty dollars per month. Female domestics, from fifty cents to one dollar and seventeen cents per week, according to goodness and service required. Common price one dollar.

Non-enumerated articles.—Millet is beginning to receive some attention in this region. Its productiveness and value as a fodder, entitle it to more general notice. From E. Williams, Esq., of this town, who has sown it for two years past, I gather the following facts: He turns over exhausted meadow land soon after planting, spreads on manure at the rate of twelve or fourteen loads per acre, harrows thoroughly and sows. Quantity of seed sown, sixty-nine quarts per acre. Amount of fodder harvested, four tons per acre, by weight, when cured; equal to corn stalks when cured for sheep or young stock; gives from twenty to twenty-four bushels of seed per acre, which sells for one dollar per bushel and is valuable for fowls.

Sowing corn for fodder has been tried, to some extent, with very good success. Management similar to that of millet, only that a greater amount of seed is necessary. From two to three bushels are used, sowing thick causes the stalk to grow small, and if well cured it is greedily devoured by animals. Its value for horses speaks loudly in its commendation, especially when they are accustomed to dry fodder, its loosening qualities are highly beneficial. When horses are subject to worms its good effects are also con clusive. Its saccharine qualities probably induce the worms to quit their hold upon the animal to feast upon its richness and they are gone, ere they are aware of it. It must be cut finely before feeding of course.

I have continued my remarks altogether beyond my first expectation, which seemed necessary in order to give a glance at the numerous topics of enquiry.

Yours truly,
WILLIAM BACON.

Richmond, Massachusetts, Nov. 24, 1847.

Agricultural Rooms, *Albany*, *January* 26, 1848.

Hon. Edmund Burke,
Commissioner of Patents:

In answer to your letter requesting the aggregate amounts of our crops, &c., it is proper to say that the very short period allowed to make up returns, will prevent my giving as full a statement as I might have done, had I received your request at an earlier period. I can only give you a general statement as to the crops of the year 1847, and also extracts from the returns of some of our county societies which speak more particularly in relation to the crops of the last year. The annexed general statement will show as near as can be ascertained at this time, the characteristics of the season, and the general view of the agriculture of the state.

Wheat.—Of this crop it may be said that, notwithstanding the unfavorable appearance of the early part of the season, it proved a fair crop—the quality in most parts of the state remarkably good. In some parts of the state the crop was injured by an open winter. The yield of the whole state is believed to have been an average of former years.

Barley.—The crop of barley is less than usual. The yield per acre in the best barley districts of the state, much below the average of former years. The appearance of the crop previous to harvest was very fine, but owing to the dry weather probably, a diminished yield was the result.

Oats.—The crop of oats was large. The yield in many counties varying from 70 to 100 bushels per acre. The increase of this crop from superior cultivation is very considerable.

Buckwheat.—This crop was remarkably good, and the season being favorable to its maturing, it was secured in good condition, and may be considered more than an ordinary yield.

Indian Corn.—This crop was much larger than usual, probably one-third more land under cultivation than is usual. The crop generally excellent. In some portions of the state the weather in the fall was unusually damp and the cob did not dry readily and some fields were injured, still taking the state together there is a very large increase.

Potatoes.—The potato crop has proved a light yield, and the disease has prevailed to a very great extent. No remedy has been discovered, although theories in abundance have been put forth—careful attention to the selection of seed and preparation of the ground, use of lime on the tuber at planting, and planting early varieties and harvesting early, have, where adopted, seemed most conducive to sound and healthy tubers.

Hay.—Has proved an average crop—from one and a half to two tons per acre. In many instances a much larger yield, from three to three and a half tons.

Flax.—The crop of flax is not extensive in this state, but increased attention it is believed is being given to it.

Tobacco.—This is cultivated to a very limited extent in a few localities.

Silk.—The culture of silk is not extensive; attention is given to it in some few localities, but it is believed that if suitable attention was given to it a supply for our own use might be manufactured and with advantage and profit.

Sugar.—Maple sugar is made to a large extent and the quality is improving, and in some sections of the state sugar equal to the very best cane sugar is made. By the census of 1840 the quantity of sugar in this state returned was eleven million pounds and upwards. In our census of 1845 it was very unfortunately omitted. There can be little doubt, that it now exceeds the amount returned in 1840, and of far superior quality.

Most approved Rotation of Crops.—There is no system so general as to be given as the best rotation for the whole state, embracing so wide an extent of country, and a very great diversity of crops. Our best farmers however, are giving attention to such a succession of crops as will best secure the fertility and productiveness of the soil, and obtain the most economical expenditure of the manure used. The improvements which are making among our farmers, in regard to system in their modes of cultivation is in the highest degree encouraging.

Root Crops.—The cultivation of root crops is attended to in some portions of the state, and the average yield, when these crops receive attention may be stated per acre for sugar beets, from 500 to 800 bushels; carrots 800 to 1000; ruta baga, from 800 to 1300.

Peas and Beans.—The average yield of peas and beans is from 20 to 40 bushels per acre, varying much, according to the method of cultivation.

Fruit.—The increased attention which is given to the cultivation of fruit in this state is very encouraging. Agricultural and horticultural associations are making increasing efforts to interest farmers in the subject. The demand for apples, both for domestic and foreign markets is increasing and the quantity shipped the past season from the interior of the state is very large. To show the extent of this business, I give an extract from a communication from Oneida county, one of our central counties: "My estimate of the quantity of apples shipped from this place (mostly from four towns) year before last, ten thousand barrels, last year (the crop not being as large) seven or eight thousand barrels, and this year not much short of eighteen thousand barrels. Prices have averaged from sixty-two and a half cents to one dollar per barrel nett. Our orchards usually comprise from one to four acres and many of them yield from 1 to 150 dollars, according to the number of cultivated trees in each. Perhaps the most productive orchard in this county is the one known as the Goodsell orchard, which was mostly grafted—the individual who occupied the farm year before last, informed me that he picked and sold over one thousand barrels that year, which sold for over one thousand dollars. Last year was not as large, but the past season I presume was as much or more. This orchard contains about six acres, a large proportion of the trees grafted, &c." From other portions of our state I could give similar extracts, but the above will show the importance of well cultivated fruit to the interest of the agriculturists.

Other varieties of fruit such as pears, plums, peaches, cherries as well as the smaller varieties, are cultivatad increasingly throughout the state.

Dairies.—There has been a large increase this year in cheese, and butter probably about the usual quantity. A steady improvement is making in the quality of cheese and butter. The foreign demand for cheese is calling for an article suited to the market and different from cheese used in this country, and the kind desired is now furnished in great perfection.

The quality of much of the butter made in the central and western counties of the state *equals that made* in any part of the country for its valuable and preserving qualities in hot climates.

A letter received from an extensive provision merchant in New York says:—"Many dairies which I could mention received from Chemung county, have been sent to New Orleans to my certain knowledge, and they *stand the climate* equal to any Orange county dairies, and they fetch as high a price as any of the Orange county."

Another says:—"The butter made in the county of Chemung is equal to that made in Orange county, and will stand the *southern climate as well.* Also that made in Tompkins county is well suited for shipment south, and *stands the salt air* as *well as any butter* received at New York."

I might multiply remarks of this kind, but these are sufficient to show, that the range of country in this state, where butter which will stand the test of heat and climates and foreign voyages, is not confined to one locality, but extends to a very large portion of the state. This is a fact that is but little understood abroad, and should attract the attention of those who are making large contracts for butter.

Stock.—There is a manifest improvement of neat cattle and horses in this state. The introduction of short horn, Devon, Hereford and Ayrshire cattle, into the state, has proved of great advantage to the grower of stock. A cross with our native cattle has in many cases proved highly successful, and the more extended use of thorough-bred animals, will still more increase the value of our stock. We have several herds of improved animals in the state, and the extension of these animals will continue to improve the stock of the state. Our agricultural associations have proved useful in directing the attention of our farmers to the improvement of their animals, and while, in every respect these associations have proved useful to the agricultural interest, in this department, they have proved most highly advantageous.

Sheep.—The growth of wool is quite extensive in this state. The average weight of fleece, I presume, is not far from three and a half pounds, and the price from thirty-five to thirty-seven and a half cents per lb. Sheep for mutton are raised to some extent, and as their value shall be more fully appreciated they will be far more extensively reared.

Wool depots.—A depot for the sale of wool has been established in Kinderhook in Columbia county, about fourteen miles from Albany, and has been in operation about two years. It has proved, so far, highly successful, giving to the farmer the opportunity of having his wool disposed of at fair prices at an expense of one cent per pound besides insurance. It is believed that when this system is more fully known it will be generally adopted through our wool growing districts.

Manures.—Much more attention is given to the preparation of manures and their adaptation to the various crops grown.

Draining.—Improvements in draining are being carried on to a considerable extent, and as the foundation of all good husbandry, will continually receive more and more attention.

I annex extracts from some of the reports of county societies showing the interest which is taken in agriculture and its advancement in our state.

Cayuga Co.—"Wheat has been the natural product and staple of our county. Upon the establishment of our society, the attention of farmers was directed to seasons bearing on particular crops; to the difference in soils and the natural adaptation of each for the growth of particular crops; to manure, and the application of the same, in their different forms, to the earth, from which a given crop was expected." The past year has been one of general prosperity in this county. The average crop of grain has been moderate, although the potato crop, for the most part, has been lost by disease. Our last annual fair was held at Auburn. The exhibition of horses and cattle exceeded our most sanguine expectation: about three hundred animals were entered for premiums!!

Chatauque.—"The dairy business is increasing more than any other branch of agriculture: the product of the dairy now forms a very heavy item of export from the county."

Clinton.—"The cause of agriculture is steadily increasing in this county under the influence of the society. The sixth annual show was held in October, and passed off with great spirit, and was considered decidedly the most interesting exhibition ever held in this county."

Columbia.—"The fair surpassed any previous one ever held in this county, especially in horses and cattle, and every thing manifested, that the farmers and mechanics instead of getting wearied with these annual exhibitions, are becoming more and more pleased with them."

Cortland.—"There was a manifest increase of interest in most departments of the fair, particularly in regard to the dairy, (the staple of this county.) The principal agricultural products of this county, are butter, cheese, wool, beef, pork, oats and corn. There has not been wheat enough grown for several years past for home consumption. The products are mostly marketed in this county; the butter, cheese, wool and beef is eventually sent to the eastern markets; the pork to the coal regions of Pennsylvania; oats and corn to Syracuse and Ithica. The prices obtained this year, have ranged, for butter, 15 to 16 cents per lb.; cheese 6 to 7 cents; beef $3 per hundred; pork $5; oats per bushel 30 to 40 cents; corn (last year's crop) from 50 to 75 cents. There are some large dairies in this county which yield more than 150 lbs. of butter per cow, and others that turn out 400 lbs. of cheese per cow. Indian corn, the average crop with good farmers, is believed to be from 50 to 75 bushels per acre, and of oats from 40 to 60.

Dairy Cows:—

One cow	produced in 4	weeks,	887	lbs.	of milk, and	58	lbs.	6	oz.	butter.
Another,	"	"	1242	"	"	46	"	3	"	"
Another,	"	"	1041	"	"	45	"	2	"	"
Another,	"	"	——	"	"	39	"	8	"	"

Delaware.—*Dairy.*—From one cow, there was made from 26th March to 1st of October 229 lbs. butter, besides furnishing a family of five persons with milk for daily use.

Dutchess.—"*Potatoes.*—Robert Van Amburgh, of Poughkeepsie, has raised two successive crops of mercer potatoes, viz., one crop in 1846, and one in 1847, perfectly sound and without any rot. The potatoes planted in 1845 were the small potatoes of the year before, and about the size of a hickory nut, or a trifle larger, and dug when green and before the usual time of digging, and preserved through the winter. Those planted last spring were of the same kind, and were planted without regard to size."

Erie.—*Butter.*—One cow, in one week, in June, on common pasture,
gave 310 lbs. 3 oz. of milk, and made 12 lbs. 10 oz. butter.
Another 257 " " " 11 " 2 " "

Oneida.—"The agricultural interests of the county have been constantly increasing since the organization of our society, as is manifested in the great improvements which have been made in our horses, cattle, sheep, &c.; in grain and root crops; in the products of the dairies, not only in quantity but in quality, and in the diminished expense of production." The principal agricultural products of this county are, butter, cheese, wool; the various kinds of grain, viz. Indian corn, oats, barley, wheat, rye, together with root crops and hay; horses, cattle and sheep. The prices of produce the present year have varied very much and have been constantly changing, yet on the average they have been remunerating to the farmer, and better than they usually are. Almost all kinds of produce have commanded ready cash.

Butter.—One cow (ten years old) three-quarter native and one-quarter Durham, on grass feed, yielded 50 lbs. of milk per day, and made 17 lbs. 5 oz. butter in one week. A heifer two years old, one week in June, from her milk was made 8 lbs. 5 oz. butter. Eighty milch cows were on exhibition at the annual fair of this society.

Onondaga.—The society's exhibition was one of the most interesting ever held. In this county *farmers' clubs* have been established for two years; hold meetings weekly for discussions, which have proved very interesting, and highly useful.

Rensselaer.—*Butter* made from three cows, in thirty successive days, commencing 12th June, feed, pasture only, 106 lbs. 4 oz.

Rockland.—"The principal agricultural products of the county, are wheat, rye, corn, oats, buckwheat, potatoes, &c. Wheat, is gradually taking the place of rye, and is considered to yield as much per acre.

"Corn is raised in considerable quantities, and averages from thirty to forty bushels per acre, though fifty and sixty bushels is not rare; oats from thirty to sixty bushels per acre, and sells for 44 cents; potatoes are raised in large quantities and average 50 to 75 cents per bushels, being in the vicinity of the New York market. All varieties have suffered much from the rot. *Very early planting*, in light soils has been the only preventive.

"*Dairies.*—In this county, farmers on and near the line of rail road, send their milk to New York, and receive from 1¾ to 3 cents per quart, and some dairies average $40 per cow, annually.

Milk—One cow gave last week in December, 23 quarts per day; her feed
dry hay and turnips.........,.................... 161 qts. per week.
One gave 25¾ qts. per day, on pasture, in July,.. 180 " "
" " 56 lbs. milk per day in July........... 154 " "
One day's milk churned, gave 1¾ lbs. of butter.

Seneca.—In this county, town associations have been held with great interest and success, where subjects for discussion have been brought before the farmer and elicited great interest. Thorough draining has been adopted by many farmers, and the result proves most advantageous.

Of the crops in this county it is said wheat is 30 per cent. less than 1845, owing to severity of winter, average per acre 14 bushels. Barley 10 per ct. more, average 17 bushels per acre. Oats 30 per cent. less, average 36 bushels per acre. Indian corn 30 per cent. more, average 30 bushels per acre. Potatoes 60 per cent. less, 100 bushels per acre. Hay 15 per cent. more, 1½ tons. Most approved rotation, wheat and clover, with an intermediate summer fallow.

Suffolk.—The important changes which the appliances of art and the theories of science are working in agriculture, throughout the civilized world, are silently and unobtrusively, but surely effecting a vast improvement in the agriculture of this county.

"I should not, perhaps, omit to mention, that in the midst of our prosperity, we met with a serious loss in the total destruction of our apple crop. Soon after the leaves appeared in the spring, they were attacked by a minute insect, of a bluish color, which covered every leaf, and in some instances whole branches of the tree, in a few days destroying all indications of its vitality, and giving to its naked branches the appearance of having been seared by fire. Their ravages were confined exclusively to apple trees; few, if any of them escaped the blight, and scarcely a bushel of apples were grown in this county during the past season."

Wayne.—The agricultural products of the county are wheat, rye, oats, barley, buckwheat, peas, beans, Indian corn, pork, beef, wool and apples. But few roots are raised, beyond garden culture, save the potato, which must rapidly decrease if the present disease should continue a few seasons more. I think I can safely say, that more than three-quarters of the present crop is already spoiled. I have not been able to procure any statistical table for the county, and cannot specify the amount raised, nor the value of said products. Wheat was not more than two-thirds of an average crop, the past year. The following will not vary far from the average:—Wheat 10 bushels, rye 10, oats 30, barley 20, buckwheat 20, peas 15, beans 15, corn 35. But little pork is raised for market, and commands $4 50 per 100 lbs. Beef on foot $3 00 per 100. Stalled beef $4 50. Wheat is worth $1 25. Corn 50. Oats 37½. Barley 60. Many thousand barrels of apples are annually sold, comprising the finest varieties known to horticulturists, and the quantity is increasing. The price from 62½ to 75 cts. per barrel—barrel found by purchaser. Large quantities of dried apples and peaches are also sold to the merchants in exchange for goods. Apples 75 cts.; peaches from $3 to $4 per bushel.

The annual clip of wool cannot vary far from 300,000 lbs., of which not more than one-half is sold for export, at the low price of 28 cents per lb. There are but few good flocks in the county.

But little cheese is made. Of butter, the average per cow exceeds 100 lbs., usually sold for 12½ cents per lb. This year worth eighteen pence.

Yates.—The crop of wheat will not vary much from the amount as given at the last census—403,000 bushels—but uniformly more plump, straw free from rust, but little injured from the effect of the *insect*.

Corn and Barley.—Perhaps there never was so large an amount raised in the county. I think I am safe in setting this down at 25 per cent. more than that of 1845.

Of *Potatoes.*—There was the usual quantity planted, and one thing in particular I have marked, and that is I have yet to learn the *first instance* where *early planting* and *early harvesting* has been pursued this season, that the *rot* has affected the crop *in the least.* I should think that *two-thirds* of the potato crop has been destroyed by the rot.

Statement of crops reported by the different county societies, on which premiums were awarded:—

	No. bushels per acre.									
Winter wheat, .	42	39	35	33	32	27	26	25	24	
Spring wheat, . .	40	27								
Indian corn, . . .	143	140	137	129	127	124	116	112	110	107
	100	91	89	86	84	67	65	56	50	
Oats, ...	100	90	86	84	83	76	63	61	55	
Rye, ...	45	37	23							
Buckwheat, ...	40	30	21							
Barley, ...	53	49	47	39						
Peas, ...	43	41	34	25						
Beans, ...	33									
Potatoes, ...	410	405	360	334	324	294	258			
Ruta bagas, . . .	1317	682	628							
Carrots, ...	1079	900	894	760	680					
Sugar beets, . . .	760	530	528							

I regret that I have not had time to make my statement more full, and shall be gratified should this be found useful to the Commissioner of Patents in making up his report.

I am, very respectfully, yours,
B. P. JOHNSON,
Secretary New York State Agricultural Society.

WHEATLAND, Nov. 20th, 1847.

JAMES W. THOMSON, M. D.,
Cor. Sec. of the Ag. Soc. of N. C. Co.

Dear Sir:—In compliance with the appointment of myself, as notified by you, at the August meeting, held by the Farmers' Club, at Union Farm, to collect and report on the agricultural statistics of the state of Delaware, and reply to the inquiries of the Commissioner of Patents enclosed to me, I herewith tender to the Club, through you, the long and devoted friend and founder of both the Agricultural Society and Farmers' Club, of this county, the following facts, collected and collated with much trouble and care. The plan I adopted was to take, as accurately as possible, the amount of the crops grown in School District No. 58, New Castle county, which is the district in which I reside. The district contains 8173 acres, all told, which is divided into 23 farms, varying from 95 to 750 acres each, of which in

	Bushels.	Value.
1845, 972 acres were sown with wheat—produce,	13,847	
1847, 921 " " " " "	12,733	$16,559 90
1845, 1224 " " " oats "	25,627	
1847, 1127 " " " " "	9,841	3,936 00
1845, 1273 " were planted in corn, "	28,514	
1847, 1393 " " " "	42,718	25,630 00
Straw of wheat and oats, and corn fodder,		7,250 00
Aggregate of the crops,		$53,365 90

I have allowed $1 30 per bushel for wheat, 40 cents for oats, 55 cents for corn, and for the value of straw, I have calculated the straw of thirty bushels of wheat and oats to make one ton, and allow four dollars per ton; and for the price of corn fodder, one dollar for the fodder of each *ten* bushels of corn.

The above statement shows a falling off of wheat of 1,114 bushels, and of oats of 15,787 bushels; but an increase of 14,204 bushels of corn in this district. These three are the staple crops, and the only ones that I could obtain accurately, without giving more time than I could devote to the subject. I have omitted taking all others, except by conjectural estimates obtained from persons from different parts of the state. The three next considerable crops are hay, potatoes and peaches. The potatoes bade fair to be abundant till October, when they began to rot, and from all that I can learn of this valuable crop, fully half are lost by the rot, both in Delaware and elsewhere; and so also the hay and peaches were equally deficient: the hay, from the drought of the spring, and the peaches from other causes—perhaps the unfavorableness of the spring. There being no data *laid down in the books,* by which I could compare the peach crop of 1847 with that of 1845, I have set down, from the best information I could get, 300,000 baskets to the state. Major Reybold & Sons sent away over 100,000 baskets; other orchards in the county of New Castle, say 100,000 baskets more, and 100,000 baskets as the growth of Kent and Sussex.

If crops throughout the state should average with the crops of 1845, as well as in School District 58, then the crops of Delaware will stand about thus:—

Table showing the quantities of grain produced, with the prices annexed, and which is extended, by the same comparative estimate, to all field crops or breadstuffs throughout the Union.

	No. of bush. in School Dist. No. 58, N. C. co.	No. of bushels in the state of Delaware.	Price per bushel.	Value of the crop in the state of Delaware.	No. of bushels in the United States.	Price per bushel.	Value of crop in the United States.
Wheat	12,733	406,000	$1 30	$527,800	97,000,000	$1 30	$126,100,000
Oats	9,841	331,000	40	132,400	65,000,000	40	26,000,000
Corn	42,718	3,619,000	60	2,171,000	626,638,000	55	344.659,000
Straw & fodder	7,270	......	....	311,750	......	....	185,053,000
Potatoes......	......	77,000	50	38,500	44,198,000	50	22,049,000
Sweet potatoes	......	51,000	50	25,500	28,000,000	50	14,000,000
Barley.........	......	4,500	60	2,700	5,160,600	....	3,096,360
Rye...........	......	53,000	80	42,400	27,175,000	80	21,740,000
Buckwheat....	......	13,000	60	7,800	10,268,000	60	6,160,800
Hay, (tons,)...	......	9,500	15 00	142,500	7,065,000	....	105,975,000
							$850,833,960

By comparing the statement above, with the crop of 1845, adopting the crop of School District 58 as the basis, it will appear that the crop of corn is about one-half greater for the year 1847 than that of 1845; showing an increase of about 208,000,000 bushels, at 55 cents. According to the same comparison, the crop of wheat is about one-twelfth short of the crop of 1845, and that of oats one-half short of the crop of the same year, as will appear from the following table:

1845.	Loss in oats,	$26,000,000
"	Loss in wheat,	105,333,333
"	Loss in potatoes,	22,049,000
"	Loss in hay,	105,975,000
"	Loss in straw, &c. about,	21,000,000
		$185,557,333
		127,000,000
		$58,557,333

Crops of Delaware and United States for 1839, 1845 *and* 1847

Crops of Delaware.	Wheat.	Barley.	Oats.	Rye.	Buckwheat.	Corn.	Potatoes.	Tons Hay
1839....	315,165	5,260	927,405	33,540	11,299	2,099,359	200,712	22,483
1845....	440,000	4,500	828,000	53,000	13,000	3,322,000	155,000	19,065
1847....	406,000	4,500	331,000	53,000	13,000	3,619,000	77,500	9,500
Crops of U. States.								
1839....	84,832,172	4,461,504	123,071,341	18,145,567	7,291,743	371,531,875	108,298,060	10,248,108
1845....	106,602,500	5,160,600	163,208,000	27,175,000	10,268,000	417,899,000	88,392,000	14,065,000
1847....	97,000,000	5,160,600	65,000,000	27,175,000	16,268,000	646,638,000	44,196,000	7,032,500

Many other items of field produce ought to have been enumerated, consisting of the produce of orchards, nurseries, fruits of various kinds, culinary vegetables, &c., one item of which, peaches, as previously stated, amounted, in Delaware alone, to 300,000 baskets, which, at 40 cents per baskets, would amount to $120,000. The amount and value of which I have no means to approximate with as great a degree of accuracy as is already within the reach of the assistants of the Commissioner of Patents, and I will leave them to do it. I will here remark, that these few memorandums satisfy me of the great difficulty the commissioner and his assistants have in making up their reports, even to their own satisfaction. I sent out the blanks that were furnished from the office at Washington—they have never been returned by those I sent them to in distant parts of the state. I have been compelled to gather from conversation, and note any thing of value as I could get it. Here I must say one word for the benefit of editors who profess to publish prices current, that I was astonished at the lameness of their reports. Out of fourteen different papers which I subscribe to and pay for, among which are four professing agriculture, the rest made up with political items of both parties, only one of them had the price of potatoes, (the St. Louis New Era,) none had the price of buckwheat, nor had any of them, the Patent Office reports included, the price of *straw and corn fodder*, an item second in value of the products of the farm field, and made more valuable since the invention of Urmy's Mammoth Straw Cutter, and others nearly equally valuable. I however found data, whereby to form an estimate, from the report of Jonathan Jenkins' farm, (of Kent. Co. Del.) as published in Huffington's Delaware Register. Every one of those papers had the price of whiskey! Is it not astonishing, that an item of such importance as straw and corn fodder, should have been overlooked in the statistical reports of the field produce when taking the census? And here I will call the attention of all editors of papers, from the little county, up to the great Union, at Washington, to a matter of great importance to farmers: let them once every year give us the accounts of our exports of breadstuffs, designating to *what country* each article is sent—give us the treasury report of domestic exports—it is not enough to tell us that we *can furnish* the world with breadstuffs—we want to know *who is willing* and *able* to pay for them.

The wages paid to good field hands in New Castle county is $10 per month; in Kent and Sussex $6 to $7 per month, and for females to do housework in Sussex and Kent, where the county is purely *agricultural*, wages are $1 50 to $2 per month; in New Castle county they are much higher, $1 per week, is below an average to do housework; and in the factory of C. I. Dupont, it is stated in the Delaware Gazette, which is now before me, that girls get $18 per month, and some as high as $80 per quarter. Mechanics' wages rule high here—they being regulated by the Philadelphia prices. Our population, which had for almost half a century come to a stand still, has greatly increased within the last few years. Instead of population leaving us as formerly, for the far west, we are receiving a great increase. Near three hundred houses are annually built in Wilmington, and have been, for several years back, say 1842; her population, in 1839, was but 8,367—now approaches 14,000!

We are also doing much to improve our lands: lime, ashes, poudrette, bone dust, guano, plaster and *Noble's composts*, are extensively imported and applied, besides much marl, which is found on many of our farms, and well the outlay is repaid, as may be judged by the fact that, within a few weeks a large farm has been sold in district 58 for thirty dollars per acre, that was purchased a few years back for less than five dollars per acre. But little improvement has been made on this farm; it took its value from the improvements going on in the vicinity of it. The increase of population in the whole state may be set down fully equal to the increase of the wheat crop since 1839, and may be safely placed at one hundred thousand.

I will here remark, the reason I have put down the barley, rye, and buckwheat at the same price they were at in 1845, was because I thought that the buckwheat, which is very abundant, might balance the amount and value of the crop of barley and rye.

Your friend and co-laborer in the good cause,

J. JONES.

A.—*Amount of Wheat, Corn and Oats, raised in School District fifty-eight, in the years* 1845 *and* 1847.

	No. of acres in farm.	No. of acres in wheat.	Bushels of wheat.	No. of acres sown.	No. bushels grown.	Corn, acres planted.	Bushels gathered.	Acres planted.	Bushels gathered.	Oats acres sown.	Bushels gathered.	Oats, acres planted.	Bushels gathered.	Bushels per acre in 1845 and 1847.					
														Wheat.		Corn.		Oats.	
		1845	1845	1847	1847	1845	1845	1847	1847	1847	1845	1845	1847	1845	1847	1845	1847	1845	1847
1. N. Smithers.	95	22	220	20	340	20	400	22	440	20	400	20	160	10	17	20	20	20	80
2. J. Clayton	175	27	480	30	500	45	900	40	1,200	36	900	42	500	14	16 2-3	20	30	25	12
3. J. Jones Wheatland	364	160	2,884	115	2,200	100	3,000	120	5,000	30	1,000	00	000	18	19 7-19	30	41 2-3	33 1-3	00
4. J. Jones Gambush	380	26	328	40	364	50	803	50	1,000	35	600	35	160	12 8-13	9 1-10	16 1-16	20	17 1-7	5
5. A Beaston	400	75	1,200	75	1,100	80	2,200	115	3,500	75	1,200	75	750	16	14 2-3	27 1-2	30 10-17	16	10
6. Col. J. Clayton, (Choptank)	406	60	1,100	51	1,100	95	1,800	76	3,000	107	3,000	136	2,200	16 1-3	21 4-7	19	40	28	16 3-17
7. Col. J. Clayton, (Choptank East)	600	75	800	50	980	65	686	66	1,000	75	808	56	360	10 2-3	19 3-5	10 7-13	27 3-11	10 7-9	6 5-9
8. B. Armstrong	90	5	30	6	30	30	400	20	3,000	20	300	20	70	6	5	13 1-3	15	15	3 1-2
9. H. Smith	400	40	600	60	470	100	2,000	110	3,000	100	2,000	70	500	10 1-2	7 5-6	20	27 3-11	20	7 1-7
10. G. Herbert	360	80	1,100	55	800	50	2,800	100	4,000	58	1,500	45	500	13 3-4	14 6-11	56	40	26	11 1-9
11. J. Biggs	612	70	850	80	850	100	2,300	100	3,500	100	1,600	50	500	12 1-7	10 5-8	23	35	16	10
12. J. Moody	195	5	50	10	120	20	400	30	600	20	400	20	60	10	12	20	20	20	3
13. W. Hoops	250	4	32	22	169	45	900	20	600	60	710	30	450	8	7 2-3	20	30	11 5-6	15
14. J. M. Smith	750	50	700	50	678	100	2,000	100	2,000	100	1,800	100	700	10 2-5	13 4-7	20	20	18	7
15. S. Burnam	220			2	40	40	300	40	600	40	400	40	90		20	7 1-2	15	10	2 1-4
16. Dr. T. Naudain	225	25	330	25	380	25	700	25	678	25	500	25	175	13 1-5	15 1-5	28	27 1-8	20	7
17. E. Naudain	145	36	360	30	300	30	500	30	600	30	600	30	160	10	10	16 2-3	20	20	5 1-3
18. J. Ellison	360	60	1,086	75	1,227	55	1,400	100	3,700	110	3,000	90	104	18 1-10	16 1-3	25 5-11	37	27 3-11	11 5-9
19. L. Ellison	300	20	400	20	450	40	1,000	45	1,200	40	1,000	40	350	20	22 1-12	25	27 1-3	25	8 1-2
20. J. Cain	80	7	125	7	75	12	360	12	500	10	3,000	10	100	18	10 5-7	30	41 2-3	30	10
21. J. Biddle	500	70	400	40	250	70	1,700	70	1,700	75	1,900	160	300	5	6 1-4	14 2-7	14 2-7	25 1-3	2
22. J. McIntire	216	25	312	30	418	32	760	30	1,000	27	400	25	500	12 1-2	14	23 3-4	33 1-3	14 7-9	20
23. J. R. Price	150	30	460	28	492	27	1,208	72	2,800	37	1,309	10	216	15 1-3	17 4-7	44 3-9	39	35 1-3	21 3-5
	8,173	972	13,847	921	12,733	1,231	28,514	1,393	42,718	1,224	25,627	1,129	9,841	14 1-2	13 4-5	23 1-6	30 5-8	20 11-12	8 5-7
														Average crops per acre.					

The above averages present some remarkable variations for the two years compared.

S. Bentz's important improvement in preparing wheat and other grains for flouring.

This system overcomes what has hitherto been deemed an *impossibility*, and will not fail to *revolutionize* the *system* of *milling* as now practised. The simple expedient of taking the outer coating or bran from the wheat berry *previous to grinding*, produces the following important results, viz:

1st. All varieties of wheat, white yellow and red, &c., are at once *improved* from 5 to 15 cents per bushel, and the good varieties of red and yellow wheats will make as *good* and *fair* meal as the white varieties *now do*, which ordinarily sell at 10 to 15 cents higher per bushel than the red.

2nd. The outer coating being taken off before grinding, all impurities at once are necessarily removed, and the brown specula which detract from the quality of the flour will not be found.

3rd. As a general matter it takes four and a half bushels of average wheat, or 270 pounds to make a barrel of flour weighing 196 pounds. Upon this system nearly all the meal that ordinarily becomes incorporated with the *several varieties of offal* is saved and put into the barrel, and is added to the yield which is a saving of from 40 to 52 pounds of wheat over and above the average amount used in every barrel of flour, as now manufactured.

4th. From 25 to 50 per cent. of *time* is saved in grinding upon this system over the ordinary *mode*, and the work done much more evenly and regularly, as the usual difficulty of specking the flour with the bran is entirely obviated and the contingency of having super flour cut down to fine, with common skill in grinding cannot take place.

5th. This system will produce the best HOT CLIMATE FLOUR known in the world. It is an admitted fact that the bran, which upon the common mode of grinding necessarily incorporates itself to some extent with the meal is the chief cause of the flour *souring* in hot climates.

6th. In addition to the *unbraning* of the berry, the wheat undergoes an operation which superadds to the hot climate principle, and which must supersede every other plan to preserve sweetness in the flour. This will be found to be of great importance to the shipping interest and to the dealers in hot climates especially

SAMUEL BENTZ.

Boonsboro', Md., September 10, 1847.

Boonsboro', November 21, 1847.

Dear Sir:—As you are about to bring out your report I would take the liberty to mention a few facts in addition to those mentioned in my circular. By experiment I have discovered that the bran which I take off by my process possesses the property necessary to make the rising or sorts for the purpose of baking bread. The bitter principle is developed in the outer coating which I divest from the wheat, in the exact proportion necessary to produce good bread. Oftentimes in the employment of hops for this purpose, too much pungency is communicated to the bread, and that peculiar sweetness which indicates good bread, is often destroyed. The God of nature has beautifully and wisely provided the wheat berry, with the elements of its own fermentation, and in so mild a form and yet so efficiently, that the sweetest bread is thereby produced.

Another fact which may be of importance to the government: The "navy bread" is usually made out of the coarser particles of the meal, and must therefore be largely incorporated with the material possessing this bitter principle, as developed in the outer coating or bran. Navy bread prepared out of wheat submitted to my process, is effectually freed from this and a much more healthy and a perfectly sweet food may be obtained, and I doubt not much less liable to the contingency of souring as in the case of flour, because of the absence of the fermentating principle mainly found in the outer coating. You can readily ascertain the truth of my observation by taking a dozen or more grains of the wheat with the coat *on* and chew them thoroughly, and after taking the wheat out of the mouth, the peculiar *pungency* will indicate itself to the taste, whilst the wheat divested of its outer coating, gives no evidence whatever of the principle referred to. These simple facts may become important upon a farther development.

Since I transmitted to you the specimens of wheat, with my circular, I have taken the same kind of prepared wheat and reduced it into flour to ascertain the complexion of the particles which upon the first grinding, would not be thoroughly pulverized, and to my great gratification I find that every particle of such wheat, embraced in the yellow and white varieties, will go into flour, after the outer coating is taken off, and produce standard superfine flour. Upon exhibiting this experiment to our most experienced millers, I received their entire concurrence in the fact just named, and this demonstrates the vast gain this system gives over the one now practised upon in this and other countries. The weight of the bran or outer coating would therefore in the common superfine flour, constitute the *offal*, weighing only 5¼ lbs. to the barrel of flour, whilst the ordinary weight of offal is from 65 to 70 lbs. to each barrel of flour, showing a gain of from 59¾ to 65 lbs. of wheat in every barrel of flour of variety of wheat. This will fully enhance the value of the grain crop of the United States from 10 to 15 per cent.

I am, very respectfully, your obedient servant,

S. BENTZ.

Hon. Edmund Burke,
Com. of Patents, Washington, D. C.

Buckingham County, Va., Nov., 1847.

Dear Sir:—Your esteemed favor requesting my aid, to enable you to carry out the design of Congress in ascertaining the increase or decrease per centage of crops, as compared with those of 1845, is now before me. * *

Residing in the tobacco region of Virginia on James River, one hundred miles above tide water, and tobacco being our great staple, I will commence with that crop. The crop of 1845 was a very good one in quantity. The crop of 1846 was of inferior quality, and I learn 52.000 hhds., at the average weight of 1,450 per hhd. and the average sales $4 per hundred pounds. The crop of the current year (1847) which will be in the market in 1848, will be far short of the two preceding years; the western states have for several years grown larger crops of tobacco, which together with the crops in the Atlantic states, has given a supply of the article greatly above the demand in foreign markets; that with the reduced price, the enhanced price of corn (maize,) has determined our planters to abridge their tobacco crop from one-fourth to a third less, and enlarge their corn crop, so that I estimate the tobacco crop as low as 40,000 hhds. We set out 3,500 plants to the acres and expect a yield of 800 pounds; our rich lands will yield 1,000 pounds. Our people are disposed to curtail the tobacco crop and increase the wheat crop, although a delicate and uncertain one, but are deficient in land, owning many slaves that have multiplied and increased, while the acres have remained stationary, except in loss of fertility.

The wheat crop of 1845 was very short, having sustained great injury by frost as late as the 7th of May, the crop of 1846 in my estimation was twenty per cent. better, and the crop of the present year better in quality and about twenty per cent. in quantity than the crop of 1846; upon our corn lands we seed about four pecks to the acre, upon fallows about five pecks, and upon tobacco ground and alluvial bottom lands, six to seven pecks. For the transportation of wheat to Richmond, by the James River and Kanawha Canal, the toll per ton is three and a half cents per mile, and freight four cents per bushel for the entire distance, say one hundred miles.

As to rye, barley, oats and buckwheat, they are not market crops, and sales are made only to the towns and villages in the vicinity. Corn (maize) is largely cultivated—we consider it the staff of life, and in average seasons we calculate upon from fifteen to twenty bushels to the acre a good average crop, and generally worth from sixty to seventy cents a bushel. As to edible root crops which your queries embrace, such as potatoes, round and long beets, carrots, turnips of various kinds, including the ruta baga, they are cultivated for family use and to some extent for stock. As to your enquiry respecting the probable proportion of arable and forest lands, I conjecture that in east Virginia, in our maritime counties, from the head of tide water to the Chesapeake bay, three-fourths has been cut over and cultivated, a large proportion of which from bad cultivation has been exhausted and turned out into what is called old fields, and the bountiful God of nature has stocked these old fields with a plentiful supply of young pines, which when seasoned are very fine fuel, but too destructible to be of use in fencing.

The proportion of arable to forest lands from the head of the tide water to the Blue Ridge, I estimate to be about equal, and from the Blue Ridge, throughout western Virginia, I estimate three-fourths of their lands as standing in their native forests.

As to the price of labor, our mechanics charge from one to two dollars per diem; as to agricultural labor we have none; our poor are poor because they will not work, therefore, are seldom employed. As to the best rotation of crops, our best managers have resorted to the four and five shift systems, the latter is decidedly the best to give to the great auxiliary to improvement, clover and plaster, which with deep ploughing, are greatly improving our lands; unfortunately the three shift system introduced in the early settlement of Virginia from necessity, has been too long continued, as it is a land-killing system. I made this year, about 650 bushels of round potatoes, some few, when digging in October, were rotten, those that appeared sound were very hard and would scarcely yield to any pressure, and exhibited many little black specks, all such are now rotten and rotting daily in a good dry cellar, and I expect to lose three-fourths of them. I cultivated several kinds, among them the mercer is most esteemed for table use, and they are entirely exempt from the disease, growing contiguous to the infected kind, upon the same sort of soil and with like cultivation. Almost every family cultivates the round and long potato, the former the most valuable root in the world, succeeds in all climates, the latter with us succeeds well in soils three parts sand and one of clay, and is quite productive with a moist August and September.

Flax is generally raised and of fine quality, and extensively used as woof upon cotton warp for summer clothing for our negroes; the culture of hemp is much neglected, I have raised it for thirty years upon the same land consecutively, without any manure, and I believe the soil is as good as when I commenced. Hemp and the long or sweet potato are the most ameliorating crops within my knowledge.

In respect to stock generally, I reply, that this state can boast of her horses, being extensively mixed with the best crosses of the Arabian and Barb blood, and great attention has heretofore been paid to the raising of them for the turf, which is now a by-gone day; but the blood horse is appreciated as greatly preferable to the old scrub breed for all purposes, whether as roadsters or for the draught; their bone, muscle and wind being superior, gives them more strength and a better action; they excel in longevity by many years, stand heat better, and are less subject to disease. Our horned cattle are generally pretty good, being much improved by crosses of the Durham, Devonshire, Hereford and Alderney; our dairies are not very extensive, yet a large quantity of butter goes to market and is sold at from twelve and a half to seventeen cents per pound; the quantity of cheese made is inconsiderable. Our farmers generally have good flocks of sheep, of the most approved bloods, but not so extensive as to raise much wool for market; the main object is to clothe the family and supply a poor neighbor. Our muttons which are very fine, command from $3 to 4. Our stock of hogs is nearly run out by the introduction of a cross, called Berkshire and at a high figure, about as great a humbug as the morus multicaulis that sold from three to five cents a bud, which sunk hundreds of thousands of dollars.

Virginia will have to purchase a part of her family supply of pork from the western drovers, which is bad economy; but it is known that the Virginians consume more bacon than any other people.

Many of our farmers raise hay for their own use, and in western Virginia there is scarcely a farmer but who has extensive meadows, and near to our cities, towns and villages, large crops of hay are made and found profitable, selling at from 75 to $1 per cwt. Our farmers who have not meadows, secure large crops of clover hay, which together with our corn blades and tops, shucks and wheat straw, make ample supply of provender for our stock.

With high consideration of regard and respect,

Your most obedient servant,

CHAS. YANCEY.

Hon. Edmund Burke,
Patent Office, Washington, D. C.

Rosehill, Va., November, 1847.

This county, (Rappahannock,) ten years ago, produced fine crops of wheat, nearly double what it now does, and whilst lands have been improving and will produce as much or more Indian corn than formerly, the wheat crop has been gradually growing worse, amounting, some years, almost to a total failure, as was the case last year. The failures are caused, mainly, by rust. In consequence of the rust, the quantity of wheat sown is much diminished and we are suffering our lands to lie in grass, purchase cattle from the western counties of Virginia, keep them one year and sell them in Washington and Baltimore, as beeves, at an average of 75 to 100 per ct.

The oat crop was a short one with us in 1845, in consequence of drought, and from the same cause, our crop was equally shortened this, the rain having set in too late. The same may be said of rye as of wheat, it is perhaps even more liable to rust.

This, with us, has been a most remarkable season for corn, (maize;) owing to the very cold and dry spring, there was great difficulty in getting the crop to stand: the drought continued up to the twentieth of June, when we all had despaired of making one-third of a crop; the rains then commenced and continued very seasonable, and that together with the late frosts, have made our crop full an average one. There was not a half crop made in 1845, in consequence of the drought.

No potatoes are raised here to be sold beyond the limits of the county, and few or none raised for stock. This is the first year we had the rot to any extent; the loss this year is more than half, from rot. I had them in sod, sandy land, and in a hog pen, and all fared alike; the hog pen rather worst, and were planted last. One of my neighbors planted in new land and fared equally badly.

The most approved rotation with us, upon good land, is the five field system, as stated: all the manure is put upon the fallow, by which the three crops get the benefit of it. Plaster is sown upon the corn land, wheat and the clover-seed mixed with it, (one bushel of plaster and one gallon of clover-seed to an acre.) The two years that the land is in clover, plaster is sown each year; by this plan, three crops are gotten in five years—two of wheat and one of corn, the last crop will not be a good one, but is easily put in, and the land is clean and in good order to receive clover and other grass seed. Lands that are not too closely grazed improve under this system.

Those who have many negroes make their hogs weigh two hundred and fifty each; they are allowed to run in the fields until two or three months before they are killed, when they are put in pens and fed on corn till killed.

He who hires a slave furnishes him with his clothing. There is scarcely another place in the United States as far from market as we are; but we are improving the Rappahannock river, and hope to be much benefitted thereby.

The character of our soil is gray, well adapted to clover and plaster; no lands better watered, and no country more healthy.

Respectfully yours, J. G. LANE.

Hon. E. Burke, Commissioner of Patents.

Loudoun Bridge, Princess Anne Co.,
Va., Sept. 10, 1847.

Sir: In accordance with your request, I have the honor herewith to transmit a partial answer to the questions forwarded me some time since. It will be perceived, that my reply is indeed but "partial," but little attention being paid by our planters to many of the articles enumerated in your circular. So far, however, as concerns the cultivation of our great staples, Indian corn and oats, a praiseworthy improvement is perceptible. Much greater attention is given to the preparation of the lands; and many of our farmers have not only "made two ears of corn grow where only one grew before," but, by a judicious system of manuring, and an improved tillage, wider breadths are annually seeded and an increased interest manifested in the cause of agriculture.

The potato, is grown to some considerable extent in our county, but in consequence of the difficulty of transportation to Norfolk and other markets, the crop is usually consumed at home. The "rot" has appeared in this section, but not to any alarming extent. With regard to the remedy, the sufferers have adopted the plan of seeding fresh fields yearly, under the supposition, that the potato soon extracts from the soil the necessary maturing elements, and the plant either dies early or the seed produces but sickly tubers, which fail to arrive at maturity.

There is but little doubt that certain seasons produce vast telluric and aerial anomalies, as was manifest during the prevalence of the Asiatic cholera, when chemical analysis detected great changes in the organization of certain vegetables—changes, which were said to proceed from a failure upon the part of the parent soil and the surrounding atmosphere, to furnish to the vegetable the necessary amount and due proportions of earth, salts and gases. As regards the potato, it is evident that some of the maturing elements of the soil, which is essential to the safety of the plant, are absent or deficient: what these deficient principles are remains to be discovered. Science is at fault, and we are perhaps as far from understanding the true nature and cause of the potato rot as we were before any investigations were instituted. Some, as you are aware, believe an excess of acid to be the prolific cause of destruction, and have attempted to neutralize the superabundant acid, by the application of alkalies, which remedy, in numerous instances, seems to have produced very beneficial results, and to have totally failed in many others. In all probability, the time has arrived when the potato is to decline and gradually perish from the face of nature; it has occurred frequently within a few years that plants, previously numerous, have become exceedingly rare, an instance of which is mentioned in the New York "Weekly Herald," of February 19th, in the case of the johnswort, which the writer declares, "overrun the fields in the eastern states, to such an extent, not many years ago, that it was considered a curse, but at the present day, hardly a specimen of it is to be seen." These remarks, concerning the johnswort, are equally applicable to other species of vegetable; as the *chenopodium anthelminticum*, for example, which in former years might be discovered upon almost every acre of land in eastern Virginia, but can now scarcely be found, after the most diligent search.

I regret exceedingly, the paucity of my report. Situated as we are, between the Atlantic and the Chesapeake, and within twenty miles of the city of Norfolk, it might be supposed, that negligence and inactivity, alone, prevents us from standing at the head of the commonwealth. But the bars to our navigation, the poverty of our lands, the deficiency of capital, the difficulty and expense of reaching market, in consequence of bad roads and bridges, all conspire to cripple the energies of the people. The gardeners in the vicinity of the city, glut the market with root crops, pod fruits, orchard products and small fruits, and by their proximity to town, are enabled to monopolize this trade; hence, our agriculturists rely mainly upon those staples which are in the greatest demand, and leave the affairs of the garden and orchard to the suburban population. As before stated, however, a spirit of improvement is abroad; lighter navigation, by means of canals, and other improvements, are now seriously thought of, and though we may not be able to overcome the many difficulties which stand in the way of advancement; yet we are not without hope of one day seeing our county occupying a prominent position in the state, instead of being distinguished as the *caudal* extremity of the "Old Dominion."

For a portion of the information furnished in the accompanying report, I am indebted to my friend, John W. Stone, Esq., of Loudoun Bridge, a gentleman who exhibits a marked degree of interest in the cause of agricultural progress. I have the honor to remain,

Very respectfully, yours, &c., &c.
ROBERT B. HALL, M. D.,

Hon. Edmund Burke, Commissioner of Patents.
Washington City, D. C.

New Jerusalem, Hampton Co., Va., Nov. 30, 1847.

Dear Sir:—In responding to your circular issued from the Patent Office, considering the information sought of great importance to the agricultural community, I regret that my means of imparting information on the subjects of enquiry are exceedingly limited, being restricted to the narrow limits of my own county, in which but few of the subjects of investigation are cultivated, and these with more of laborious industry than skill, for as yet scientific agriculture is a stranger among us.

In investigating the few productions that come in for a share of our care and attention, and contrasting them with the crop of 1845, I shall take them in the order of their importance, beginning with the crop of corn, (maize,) premising that this has been an unfavorable year upon the larger part of our lands, which may be divided into three classes. The larger part being light, approaching to sandy, which requires moderate seasons to yield to its full capacity, and suffering less from drought than excessive rains; indeed, a heavy fall of rain, such as we had several times the past summer, falling about the time of the putting forth of the shoot, never fails to do serious injury to the crop. Next we have a free grey loam, based on a silicious subsoil, that serves in wet seasons to draw off any excess and yet is sufficiently tenacious to retain and give out moisture in times of comparative drought. This description of land is more certain than any other we have to give a fair return for cultivation, and this year has produced very finely. Lastly, we have a portion of level, stiff land, sufficiently dry to tempt the farmer to cultivate it without drains, and yet, in consequence of its level surface, holds a great deal of water during the winter, and never fails to produce badly; after a wet winter, followed by a cold spring, unusually cold and backward, it has this year produced a very light crop. On the whole, I am induced to set the crop of corn the present year at 10 per cent. below the crop of 1845.

Next in point of rank comes the pea crop, which has always been of great importance in this county. It is for the most part raised among corn, being produced between the corn hills and made at the expense of very little additional tillage, other than what the corn alone would receive. After securing enough for seed, the peas are usually fed off the land to hogs, and in that way are a very important auxiliary to the crop of corn; many farmers nearly fattening their pork on peas and potatoes; but in addition to the peas made for hogs, we are beginning to cultivate white much more than formerly, as a sale crop, usually finding them ready of sale at fair prices; but the present has been a bad year for the whole pea family. The heavy rains in July and August, which were injurious to corn, were still more detrimental to peas, and the crop may be put down at 25 per cent. below the crop of 1845.

Sweet potatoes have long been looked on as of great importance throughout the southern country, and in no part of it have they been more highly appreciated than in Southampton, where they are regarded as almost indispensable to family comfort, and are a valuable alternate in dieting our slaves. But what has given additional importance to the potato crop, is its value for feeding swine; like the pea crop it is an important auxiliary to the corn crop, many farmers, as before stated, nearly fattening their pork on peas and potatoes, only giving them corn a short time before they are brought to the knife, in order to give firmer texture to the meat and lard. The causes adverse to the pea crop were not less injurious to potatoes, producing a luxuriant growth of vines at the expense of the potato. I therefore set the crop of 1847 at 25 per cent. below the crop of 1845.

Some few among us have held on to the cotton crop amidst all its reverses with remarkable tenacity, and the rise in price last spring tempted others to try it again; but the crop is admitted by all to be very short, and sure I am that our exhausted lands can never be resuscitated without its abandonment.

Formerly no county in the state exceeded this in the production of apples and apple brandy, but on the introduction of the cotton crop, many orchards were cut down to make way for that staple, others being neglected, and brandy almost ceased to be looked to as a source of income. Since the partial abandonment of cotton more attention is paid to orchards—the old ones are somewhat reviving, and in many cases young ones are rearing. In 1846 there was the heaviest crop of fruit that has been known for many years, but the trees are yet for the most part in a feeble condition, requiring after a full hit a year to recuperate; there was consequently almost an entire failure this year.

Wheat and oats are cultivated with us to a very limited extent. As to the former, a few farmers among us are turning their attention to it as a sale crop, but it is for the most part cultivated in small lots for domestic use. The product was this year fair, and but little different per acre from the crop of 1845. In consequence of a very short crop last year of corn blade fodder, for there was a greater falling off in the fodder than the grain, there were many more oats than usual seeded and the crop proved at least 30 per cent. better than the crop of 1845; the entire product, therefore, must have exceeded that of 1845 at least 50 per cent.

We are increasing in our attention to pork raising. For many years I am satisfied enough was not raised in the county for its consumption. I now think a handsome surplus annually finds its way to market. As to a rotation of crops we can scarcely be said to have one; for many years the practice has been to have the land one year in corn and peas, and in pasture the next—a very few profiting by the advice of Arator, discontinued the pasture system, and some few others have adopted the three-field system, putting their land one year in corn and peas, the best portions of it the next year in small grain, leaving the thinnest portion to recruit, the whole shift being the third year at rest, and wherever this milder system has been adopted, the land is in an improving condition.

Most respectfully yours,
JAMES D. MASSENBURG.

Hon. Edmund Burke.

Bethphage, Brooke Co., Va., Dec'r 13th, 1847.

Sir:—It is with much pleasure that I proceed to make to you, in conformity to your circular, a report of matters relating to the agricultural interests of this vicinity. I have delayed doing so until this moment, not from any want of interest in the subject, or the most entire willingness to comply with your wishes, but in hopes of being able to furnish more accurate information and a greater variety of details. My time, however, being much occupied by various pressing duties, I have not succeeded as I could wish, and must content myself at length with statements so indefinite that they can be regarded only as approximations to the truth so far as respects the actual amount of the agricultural products of this quarter. These statements I have entered briefly in the circular, and send you in the accompanying pages such further remarks as seemed to me proper for further explanation and information.

It is certainly a matter greatly to be desired that a full and accurate report of agricultural products should be obtained annually in the United States. Newspaper and neighborhood reports are too indefinite, yet there is no doubt that the Patent Office has, by a careful collation and comparison of these, succeeded in making a tolerably near approach to the actual state of the case in its reports to Congress. Still it would be much better if greater accuracy and completeness could be attained. It seems to me that if any means could be devised by which the *assessors* of each county would be induced to make the necessary inquiries of each farmer, the matter would be at once effected. This would add little to the duty of the assessor, who is bound already to inquire of every individual or head of a family in the county the amount of his property in land, horses, cattle, &c. How easily he could add a few inquiries about crops, &c., and enter down the replies, if furnished with a printed table or schedule of the various products, &c. It would be necessary, however, that he should receive some compensation for this duty. Could not each state be induced to attend to this matter within its own limits? Would not this induce a degree of emulation between different states in respect to agricultural improvement? Each state, too, has its own peculiar agricultural products and modes of culture, which of course would, in this way, receive peculiar attention. And how admirable a report might be made out of the whole to the general government!

Certainly there is nothing which at present demands more attention than this subject. An accurate knowledge of the various productions of the country would go far in settling many of the vexed questions of political economists, at least so far as our own country is concerned. It would enable the producing community to establish a just equilibrium amongst different products, and lead to a similar result in respect to exports and imports— a matter so vital to the prosperity of the country.

It will give me much happiness to furnish any information to the office over which you preside, at any future period.

Very respectfully yours, &c., R. RICHARDSON.

Hon. Edmund Burke, Commissioner of Patents.

Bethany, Brooke Co., Va., 1847.

Wheat Crop.—This is, at least, 35 per cent. less than in 1845, throughout the very fertile district extending twenty miles east and north-east of Wheeling, Va. From my personal observation, during harvest, through the district extending thence in the same direction to Pittsburgh, Pa., a distance of 35 miles further, I am confident the crop is 75 per cent. less than in 1845. Many fields were not worth harvesting at all, and scarcely any one was seen in which there was not a considerable portion left by the reapers, as too thin to deserve cutting. An immense amount of *chess* is in the wheat this season, as is usual whenever the wheat is thin upon the ground. The *cause* of the short crop is the unfavorable character of the winter. There was but little snow—much thawing and freezing, and a prevalence of cold bleak winds in March and April.

Kinds.—The *bearded red chaff* is almost universally preferred here as the hardiest and most productive variety. Some of the white wheats, especially the blue stem and the bearded white chaff, are cultivated to a considerable extent. The Mediterranean has been tried during the last two years, but does not meet with general approval, on account of its thicker bran, and the weakness of its stem which causes it to lodge. It is, however, a valuable variety, less liable to rust than any we have, ripening two weeks earlier than any other kind grown here, and producing superior flour. It is well suited to Kentucky, and other regions where the rust is the greatest enemy to the wheat crop. Some that I have sent to Madison Co. Ky., has surpassed all the other wheats of that region. I send a sample of the red chaff.

Indian Corn.—Of this grain we have an unusually fine crop this season, owing to the favorable season, and the large amount planted. I have put it at 50 per cent. more than in 1845, and the average yield per acre this season at 60 bushels. Yellow corn is grown here for the most part. A variety called by some bastard gourd-seed is preferred. It ripens early, from 1st to 15th of September, has a small cob, and large grain. I send a specimen of the grain.

Potatoes.—This crop has never been much of an object in this neighborhood, being never raised in the large way for cattle food. A few bushels grown in the corn field have generally sufficed the farmers for family use. It was difficult to procure seed last spring, and but few were planted. The crop this year is poor both in quantity and quality. But the disease which has heretofore affected the potato so much has greatly abated this season. They seem to keep extremely well this fall. Last year I tried the experiment of sifting air-slaked lime over the potatoes before covering them with earth. The heap with which this course was pursued kept well till spring, as compared with others. About one-fifth only were rotted, while one-half of all the rest were so.

Rotation of Crops.—As this is a matter of very great importance both in practical and scientific agriculture, I regret to say it is but little understood or attended to in this vicinity. Farmers are in the habit of cropping their fields indiscriminately without any system whatever. For some time, some of the more intelligent have advocated the alternation of corn, wheat and clover. This is the nearest approach to a system of any thing generally practised, though I cannot say that this is generally practised, but farmers in general are guided by the prospects of a market and a good price as to the kind of grain they will grow. There are several considerations which must be taken into account in determining a proper system of rotation of crops.

1st. The probability of a market, or of being able to make a profitable disposition of the crop. The chief object of course, in raising any crop is profit. It is this which determines, for the most part, the use to which the land, in any given district, will be applied. If in the vicinity of the city, large portions are devoted to pasturage and to market gardening. So in remote districts far from a market, grain is raised chiefly to fatten stock to be driven to a distance. Or extensive ranges are kept in permanent pasture for sheep, and merely a little oats raised for wintering them. In what may be called grain growing districts, however, in the neighborhood of mills and markets, such as is the vicinity from which I report, we have a greater variety of crops, and also of stock, and such an equilibrium becomes established, that one crop is about as profitable as another, except when there is a sudden scarcity of some particular kind of grain. When this happens, the farmers will put all the land they can spare into this crop and continue to grow it as long as it is more profitable than others. But the land is greatly deteriorated thereby. Still it is necessary to consider how the crop is to be disposed of. For instance, the land is well suited here for barley, and this would form a very desirable alternation with other grain crops. But the price is low; there is little or no demand for it, and it would be an unprofitable crop to raise for sale, and cannot be so advantageously fed to stock as oats or corn. Again, the expense of taking a crop to market is to be considered. On the other hand, wheat is high and finds a ready sale, and is easily taken to mill. Corn is in requisition for feeding the necessary domestic animals, and can be profitably employed in fattening hogs for sale. Oats also are in demand for sheep and horses, are easily cultivated and regarded as profitable. Hence it is, that with respect to grain, we grow at present only Indian corn, oats and wheat—giving the one or the other the preponderance according to the change of market. It is, however, wrong to be governed exclusively by the consideration of the present profit to be derived from any particular crop. A change of markets is irregular and uncertain, and prices never can indicate a just and regular rotation of crops. We have therefore to consider:

2d. The mechanical labor of a crop in relation to season and climate: Every crop should be put into the soil at the proper season, and in a proper manner. One crop may be of such a nature that it cannot be well removed in time to sow another; or it may leave the field or soil unfit for its reception in a mechanical point of view. For instance, the Indian corn is ready to cut up here from 15th to 30th September; but wheat should be sowed by this time. Hence before the corn can be removed, the proper season for the wheat is past. Again, when the corn is cut, it must be put into shocks in the field to dry. These shocks are in the way in ploughing, the field and long strips are usually left where the row of shocks stands to be put into oats in the spring—a slovenly and wasteful mode of farming. The roots of the corn too, are greatly in the way, and it is impossible to put the crop in as it should be. Considered then with respect to mechanical difficulties, it is bad farming to succeed Indian corn by wheat; but we must take into view,

3d. The chemical relations of the crop to the soil. These require us to change the crop, and not only so, but to place crops in such an order that one shall, as far as possible, compensate the soil for the exhaustion of another.

To run upon one crop because it is convenient, or because there is a good market for it, without considering the necessity of maintaining the fertility of the soil, is one of the greatest and one of the most common errors. Seeing then that the only grain crops we can raise here to profit are maize, oats and wheat, the rotation which I myself approve, and which I have succeeded in introducing to some extent in the neighborhood, is what I have given in the circular, viz: 1. Maize; 2. Oats; 3. Wheat; 4. Clover. To begin with the Indian corn, we break up a clover sod for this crop, which gives great certainty of a good yield, besides that there is less washing of the soil by heavy rains. During the winter previous, too, we can deposit upon the field manure with great convenience and plough it in with the sod. Besides, as we have flocks of sheep they can be advantageously wintered upon this field, upon which the fodder of the preceding year is fed to them, thus supplying valuable manure, and suffering the meadows and pastures of the next year to remain untrodden. In the fall, there is no unusual haste required in cutting up the corn. It can be suffered to mature and be cut up and secured in shock in a proper manner, and hauled during the winter to the field in which the sheep are foddered. In the spring, the soil is in fine condition for oats, pulverulent and mellow. The oats can be put in early and a good crop is certain. In the summer, after the oats are harvested there is a fine opportunity to put out all the manure from the barn yard, to have it spread and the wheat put in, in fine order and in proper season. Upon this crop, then, there is a fine opportunity to sow clover seed in February or March. This clover grows luxuriantly and may be mowed or pastured for two full years, when the field is in better condition than at first and is prepared to undergo another succession of grain crops.

Oats is only one-fifth as exhausting to the soil as wheat, hence it may well be interposed between maize and wheat, both of which are heavy-feeders. Time is thus given to the soil to supply itself with the mineral manures requisite from the disintegration of the rocks, &c. In this way a crop of wheat (the most exhausting of all our cereal grains) will be taken from the soil once only in *six* years. I am confident this is the best system of rotation for a large portion of the middle and western states.

Orchards.—Very great attention is paid now in this vicinity to orchards. New ones are set out every year of the finest kinds of fruit. The locusts last spring were however, very destructive to young orchards. They extended from a point about ten miles east of this to a distance of fifty or sixty miles west, and as far as I could ascertain about as far north.

Sheep.—This is a great wool as well as grain growing region. The finest wool of the United States is produced in this quarter. A greatly increased attention has been paid to this branch during the last year. Bucks unusually fine have been imported from Saxony. A single one sold lately for three hundred and fifty dollars. Some of the wool produced here brings at Lowell one dollar and ten to one dollar and fifteen cents per pound. I have set down the average at fifty cents which is the price current this year for entire clips.

Manures.—This most important matter is sadly neglected here as elsewhere. Little or no attention is paid in general to the saving or creating of manures. Mineral manures, as lime, are however, used by some of the best farmers, who, likewise, haul out what is stored in the barn yard; but there is no systematic plan whatever adopted here in regard to manures.

Agricultural laborers.—These have been unusually scarce. Wages have been as high during the summer as fifteen to eighteen dollars per month and board. For the year from one hundred and twenty to one hundred and fifty dollars and board.

Laurens' District, South Carolina,
Dunlapville P. O., Nov. 11, 1847.

Hon. Edmund Burke,

Sir:—Your circular, directed to the president of the Milton Agricultural Society has been handed over to me, as corresponding secretary. I have filled out the blank form, and herewith enclose it. The year 1845, which it fixes as the standard of comparison, was for the crops of the upper districts of South Carolina, the most disastrous ever known. No estimate to be relied on could be made of that crop. High, poor ridges, in amount many thousand acres, did not yield more than a peck of corn per acre. The same may be said of cotton. Deep soils, more retentive of moisture, and creek bottoms, did better. It was deemed that not more than a third of the usual crop of corn was made, and of cotton, perhaps less. To give you some idea of the season, I take the following extracts from my note book, made at the time.

July 31. No rain; continues very hot; have to grind our meal at horse mills; creeks have become branches, and branches have stopped; trees dying; indeed the whole vegetable world seems to wither under the curse of an angry Deity.

September 24, 1845. Commenced with a regular pleasant winter; rather dry than wet. After the 1st of March, very little rain fell till the 24th August. The summer throughout was hot and windy. Wheat which was less affected by the drought was an average crop. Oats were greatly injured and short by more than half, &c., &c. Peas did not come up well, and many of them died from the heat and drought. Irish potatoes and garden vegetables failed. Pastures burnt up, and cattle generally lean. Add to this, the caterpillar made its appearance, about the 15th September, and literally mowed down the grass, which had become luxuriant, (from the rains in August,) and now threatens to destroy every green thing.

October 21. The worm (army?) continues its ravages, destroying not only the grass, but oats, rye, and every kind of small grain that was up, they also cut off the peas from the vine, and stripped fodder from the corn. They have not materially damaged cotton or turnips. After getting their growth they entered the ground, and became brown chrysalis, which, after some twelve or fourteen days, came out a fly resembling the candle-moth, &c. After other remarks, ends with—I have not discovered where they have deposited their eggs, if, indeed, they have deposited any. Small grain eat off by the worm has not come out again.

November 29. It is now dry and quite cold; cattle, &c. are nearly done picking the stalk fields, and must now be fed; considering the injury done by the worm, our pastures have carried us forward better than we expected; but now comes the rub, we have the winter to go through with cribs and barns looking lean and hungry, &c.

As the summer of '45 was the driest, so that of '47, was one of the wettest ever known. The small grain crop this year was a good average one; the corn crop the greatest, perhaps, we have ever made; the cotton ran too much to weed, and, although the autumn has been very favorable, will fall below an average, I should think 15 or 20 per cent. Irish potatoes were excellent, as they always are with us when the spring is wet; pumpkins, melons, &c. have failed almost entirely, (in '45, in moist places they were excellent;) apples, peaches, grapes, &c. matured badly and were insipid; sweet potatoes, contrary to expectation, are not good.

The drought of '45, was most intense, in nine of the upper districts; the rains in '47, have been general I believe throughout the state. It may be well to add here, '46, was a better year for every thing but corn, and that was good. I see a large error has crept into the tabular estimate of crops, both yours and your predecessors. In yours, the cotton crop of South Carolina, 1845, is put down as 40,000,000 pounds, by your predecessor 49,700,000. Yours may have been made by taking his for comparison. By looking at the tabular statements in any of the commercial papers, you will see that the export of last crop (1846,) was over 330,000 bags, or about 115,000,000 pounds, some of this may have been from the states of North Carolina and Georgia; if so the amount cannot be very great, not greater, perhaps, than our domestic consumption. Not doubting that you wish to be correct, I think it right to call your attention to this.

I hope I have furnished you as far as I could such information as you expect. I feel a deep interest in the reports from your office, and think they may be the means of disseminating much information, especially to the agricultural part of the community. There is some danger of its becoming too voluminous. Many persons, especially farmers, will not begin to read a large book. But be this as it may, I hope the practice of publishing annual reports from the Patent Office will be continued.

All which is respectfully submitted, by your fellow citizen,

JNO. H. DAVIS, *Cor. Sec'y M. A. S.*

To the Commissioner of Patents:—

My estimates are made from Hancock, Putnam and Greene counties, and I think they may be taken as the average of the first settled part of the centre of Georgia, and particularly of the eighth congressional district. That district lies in the centre of the state, on both sides of the line dividing the secondary and primitive formations, and is probably about the centre of the best latitude and altitude for the short staple cotton.

Probably, no agricultural people have ever pursued a system so exhausting to soil as the agriculture of Georgia. Lands have also borne a very low price when compared with the product; from $3 to $10 per acre, will command the best tracts; less than the expenses of the most economical plan of manuring, and then we have been giving away at regular periods wild Indian lands to the citizens of Georgia. These reasons, when aided by the large profits from the product, cotton, have discouraged all fertilizing efforts. Cut down and cripple forest lands and cultivate them, with the sole view of the largest annual profits until they will not pay for cultivation, cut down more lands, and remove from field to field, and tract to tract, leaving the exhausted lands to grow up in pine timber, and reclaim themselves, until our country has been pretty in spots, and left in all states of fertility that you can conceive—such has been the practice among us. Then we have very little turf grass, and our fertile lands are generally rolling which causes them to drain very much. All these causes should be taken into account for the low average of products, and the very great difference between the maximum and minimum.

In this respect things have changed much in the last few years. The Indian lands are exhausted; the new fertile cotton sections are so sickly, and have not many conveniences and comforts that are enjoyed here, that emigration has almost stopped, and our farmers are in earnest adopting some practical means of reclaiming and preserving fertility and making substantial improvements in buildings and orchards, that indicate a settled state of the country; but all these things are too immature yet, I think, to be incorporated in a statistical report. Respectfully,

October 27, 1847. J. S. WHITTEN.

BARBOUR COUNTY, ALA., Nov. 3, 1847.

To Hon. EDMUND BURKE, Commissioner of Patents:

Dear Sir:—In obedience to your request, I have used all the means in my power, to collect such facts as regard the agricultural interest of this section of Alabama. There is manifested among the agriculturists in general, a degree of enterprise and industry, scarcely to have been anticipated in a country so new, and where the natural strength of the soil contributes so much towards a bountiful production. This energy and industry among the farmers is not only with an object for the present, but with an eye to the future. Many who are in possession and cultivating broken lands, have adopted the horizontal system of culture, and have guard-ditched, in order to preserve the soil, whereby they may not be compelled to abandon their plantations prematurely, losing comforts and much hard labor, that it has cost them in making their plantations. Their efforts and policy has been directed with all prudence and judgment, with a view of permanently settling out the lands, and migrating to the frontiers in quest of new lands. This system of horizontal ditching is not yet in general use; but many who have tried it are so well convinced of its beneficial results, that it is fast gaining in popularity, and in a few years become general. Lands that are well guard-drained, have increased at least twenty-five per cent. in their production.

Those cultivating level and swamp lands, have used much pains in draining and redeeming lands, formerly considered too critical for successful cultivation; and in a year or two more, much land, heretofore considered valueless, will be in profitable cultivation.

Manuring.—Much attention is bestowed on manuring, particularly corn, (maize.) The manure used for corn in general is decayed cotton seed, which is considered the best to be had in our reach. Stable, lot and litter manures are used for cotton. Small grains are sown down in rotation after corn, and not manured. Of late, much attention is paid to small grain crops, for several reasons: 1st. As a crop in rotation, for special benefit of the land; 2. For the benefit of the grain, and the pasturage afforded to stock. Oats and rye are most sowed down for the above purposes. Barley, none to my knowledge

Oats.—Oats this year have been sown down to a greater extent than heretofore, but owing to the cold winter and late and wet spring, it fell short of an average yield per acre; but on the aggregate more has been made, owing to the increased amount in cultivation.

Wheat.—The wheat culture is becoming more general, than at first was anticipated. It was the impression of many at the settling of this county, that wheat would not do well here, owing to the southern latitude we lived in. But experience has proved contrary to such opinions, and for the last three years, its culture has been very much extended, and its yield and quality far superior to all former calculations. There is no doubt whatever, but when the farmers have a sufficiency of opened land to spare, but what wheat will be grown to supply bountifully the domestic wants of all who will sow down. The lands here, best adapted to wheat, are the hill lands of oak and hickory growth, with a good clay foundation. Such lands are more sure than the pine flats; the rich swamp hammocks have not yet been tested in wheat.

Rye is sown more for pasturage. It is becoming more popular for winterage than oats. As yet, it is not sown so extensively as oats, for hogs it is an excellent grain.

Corn, (maize.)—The present crop is considered by far the largest ever made in this county. I have heard of no failure, but an universal account of a heavy crop. For the last year or two, much interest has been manifested concerning the planting and culture of corn. Experience has proved that this plant requires more attention and judicious management, to produce well, than any other of the crops we are now engaged in growing, as I have above remarked, and it proves to be, so far, superior to any other manures we have at hand; and if the ground is well prepared, the seed properly put in, and good cultivation observed, an average yield of twenty bushels to the acre may be made. It is evident, from actual experience, that the lands as low down as these latitudes, do not produce as much corn per acre, as sixty miles north of us. In the northern part of Alabama, as well as Georgia, it is said that they can produce forty to fifty bushels of corn to the acre, while, with us, twenty is a fair yield. The difference is this—we are compelled to give corn ample room to make successful crops; crowded it yields poorly, stalk and grain sufficient, but ears badly; four by four feet, and one stalk to the hill, or drilled five by two feet is what is considered necessary, while in the parts above cited, they, with the same distances, can put two stalks, and produce successfully. Hence the difference is, that they have twice the amount of corn on the same quantity of land, the product twice as much as with us. Why this difference in the lands, as regards the quantity it can bear, I am at a loss to say, but nevertheless, experience, as well as the testimony of my brother farmers, will vouch for the same. Mr. Phillips, of Log Hall, Miss., has corresponded with me on the subject, and is of opinion that our lands can be made to produce more than what I have stated above. He has increased the product of his lands from 20 bushels to 30 and 35 bushels and given the *modus operandi*, a priori. I have experimented in close planting after his saying, "to produce more, more plants must be on the land," but with signal failure. It was promising until tasseling, and after that period failed, many of the shoots had nothing in them; whether it is owing to climate, or the porous nature of the soil, I am not fully prepared to say with any certainty. At any rate we are compelled to cultivate a large quantity of land to make a bountiful supply of corn. But as the farmers are now aroused to their interest, and doing much towards manuring, and improving their lands, time will soon develope what increase can be made in this useful and all important grain among us.

Peas.—This crop is luxuriant and grows well, and bears beautifully

Seldom more is gathered than is wanted for seed, the stock is turned on it every fall, which fattens readily, and saves much corn; if vines and all were gathered and housed for winter use for stock, it would save more corn as well as more lives of domestic animals.

Cotton.—The season for this crop has been adverse from beginning throughout; first the cold and backward spring, together with lice, caused the stands to be bad, and from the middle of May up to the present, it has been a continued series of heavy rains, which has seriously injured the crops, particularly on low and level lands. The boll worm in some places have done serious injury, but were not as general as last year. Hence we may predict that the crop is injured and not a full one. It will be larger than that of 1846, but how much is beyond any certain calculations.

All of which is respectfully submitted.

JOHN H. DENT.

Parish of Rapides, *Louisiana*, *Nov.* 10, 1847.

Sir:—Having received one of the circulars from your office, the object of which is to collect materials for an "Agricultural Report," and to show the extent of the crops for the present year compared with that of 1845, when the last report was made.

I proceed to give you such information as your inquiries call for, so far as applicable to this locality.

Commencing with *cotton*, the most important product of this part of Louisiana. The crop of the present year is good, and will, when gathered, be equal in quantity to that of 1845, when over thirty-five thousand bales were made in *this parish*, (a term for our civil divisions corresponding with that of *county* in the other states.) The crop of last year (1846) was nearly destroyed by the caterpillar, or army worm, and too much wet weather; so much so, that it was considered one-sixth only of the quantity was gathered as compared with that of the preceding year.

This worm made its appearance early in July, that season, and was even more destructive south of this than here. It came too late this year to do as much injury, though in some places it has diminished the crop and damaged the quality of it.

Our usual time of planting cotton is from the middle of March to the 10th of April, and we generally begin to gather it about the 10th of August, and when the crop is abundant, seldom finish this operation before the middle of December.

This has been a fine autumn for this purpose, as there has been very little rain since the beginning of September, until yesterday. The consequence is, the present crop is turning out better than was at first anticipated, both in quantity and quality.

The general yield in good land with proper cultivation this year, may be considered a bale of four hundred pounds of ginned cotton to the acre; fresh land will produce more, whilst other land long in cultivation or badly managed, will produce less.

The usual cost of freight from here to New Orleans is one dollar per bale.

As the low prices of cotton and the frequent ravages of the army worm have been for some time past discouraging the cotton planters, many of them are turning their attention to the *sugar-cane;* four or five made sugar last year with very encouraging success, and twelve or more are making sugar, some of them have full crops of cane. They began to grind about the middle of last month, and it is supposed an average yield of a hogshead per acre will be made, I understood recently that choice pieces of cane are turning out two hogsheads per acre.

The cane around here is yet green and uninjured by frost. I inclose you a small sample of the sugar made on the most northern of those plantations, that of Mr. Calhoun near latitude 32.°

Should this new product be as successful as it now promises to be, it will add very materially to the value of this lower part of the valley of Red River.

The next crop of importance is *corn*, which grows very well. It is generally planted in February, and is fit for use in August. This crop the present year is most abundant. Good land here will generally produce about forty bushels per acre. It is mostly consumed where made, and very little sent off, unless when prices are high; last year the corn in this parish was light, and in the southern part of the state nearly an entire failure.

Sweet potatoes grow here remarkably well, and with ordinary cultivation produce over one hundred bushels per acre.

The common potato, when planted in January or February, produces a good crop, fit for use in May and June.

Oats.—The kind most in repute here, is the black or Egyptian oat. This is sowed in September or October, and furnishes a good winter pasture for small stock, calves or sheep. Those are taken off in February, and the oats allowed to head. The crop is ready to be cut in the latter part of May, and a considerable part of it is then generally fed out to horses and other stock. When threshed there is usually a yield of from forty to fifty bushels of grain per acre. The same land may be planted in peas or late corn when the oats are harvested.

Peas.—For the double purpose of fertilizing the land and feeding the stock, field peas are drilled between the rows of corn early in June, and some of the pods generally gathered in November, as food and seed, when gathered carefully, about fifteen bushels of peas per acre may be obtained. The vines remain with the cornstalks as an excellent pasture after the corn is gathered. The next spring, what remains is ploughed in as the best preparation of the land for a crop of cotton—corn and peas being deemed the best rotation with crops of cotton.

On the fertile alluvion soil of this valley, manure is seldom required, and when it is deemed necessary to land long in cultivation, cotton seed applied to the corn crop is the most approved mode of using it.

Tobacco and Indigo grow well here but there is very little of either now cultivated though these were the principal marketable productions of this country whilst it was a colony of Spain.

Rice is sometimes raised for family use of an excellent quality and in great abundance to the extent of land cultivated.

Root Crops are quite productive, and carrots, beets and turnips are cultivated in abundance for the use of the plantation.

In the way of *provender* there is not much hay made, the chief reliance being placed on fodder, the leaves of cornstalks, gathered and dried at the proper season. The climate is so mild in winter as not to require a large supply of dry food for stock.

Orchards of peaches and figs yield abundantly; and small fruit, such as strawberries, raspberries and grapes are successfully cultivated.

This is a good country for *stock*, some mules and horses are raised for local use, but the principal reliance for a sufficient supply of these is in Missouri and other western states. We also obtain some mules from Texas.

There is an abundant supply of oxen and other cattle, for local consumption, and sale beef is generally worth from three to four cents.

Sheep are raised to some extent but not much pains are taken with them. The mutton is excellent, and the wool may average about two pounds per fleece.

There being no regular market for it, the price is seldom more than fifteen cents per pound. Many of the planters now manufacture coarse clothing for their people and use the wool in this manner.

Hogs are now extensively raised by the planters for their own use and killed from eighteen months to two years old; weighing from one hundred and fifty to two hundred and fifty pounds. From December to February meat is successfully cured for future use.

With reference to the *wages of labor;* that of slaves in this climate, is almost exclusively employed in agricultural pursuits. These are seldom, hired out by the master; the wages of a man slave, when so hired, is now about one hundred dollars per annum, and of a woman about eighty, the person to whom they are hired also supplying food and clothing. Mechanics, such as carpenters, would gain from forty to sixty dollars per month, according to skill. The annual compensation to overseers may be set down at from four hundred to six hundred dollars.

The produce of the dairy and the poultry yard is ample to supply the wants of those who will give them even slight attention. Bees and pigeons thrive very well.

You are at full liberty to arrange the foregoing information in such manner as will best promote the object you have in view.

I am very respectfully, yours, &c.

HENRY BOYCE.

Hon. Edmund Burke, Com. Patents.

Vermillion, *Erie Co., Ohio, Nov.* 24, 1847.

In the raising of Indian corn some experiments have been made which have produced singular results. In the year 1839, I planted one and a half acres of ground with three different kinds of corn, half acre of china, half acre yellow gourd seed, half acre white flint—the result of the crop was seventy-three and a half bushels shelled corn from the china, fifty-six and a half from white flint, and fifty-four from the yellow gourd seed. The result was beyond any thing before raised in northern Ohio, and so much in favor of the China corn, that I have every year since planted it. Now what I wish particularly to call your attention to is this, that when I commenced with that corn it was a flint corn from seven years' use, it has become so closely allied to gourd seed that the kernel is very much dented, and the ears from twelve to twenty rows; the same remarks hold good in relation to the white flint. From sixteen years' acquaintance and cultivation I am prepared to say, that it seems to bear no similarity to its species sixteen years ago; it was then an eight rowed flint corn, it is now some sixteen to twenty rows gourd seed, which demonstrates to my mind the fact that this climate changes the species of corn from one kind to that of another.

Yours, &c. ISAAC FOWLER.

Abstract of the Farm Crops of Ohio for 1847.—*Furnished by M. Bateham, Esq., Editor Ohio Cultivator.*

Counties.	Crops of 1847, compared with those of 1846.	Compared with average of past 5 years.	Average yield per acre (good cultivation.)
Adams,.......	Corn, oats, and tobacco good; oats and barley not so good.	Average perhaps better.	Oats 30, corn 40, barley 40, tobacco 1200 lbs.
Ashtabula,....	Wheat very light, other crops good.	Wheat much below, other crops above.	
Ashland......	Wheat one-third less, corn one-third more, oats one-third more, flaxseed the same.	Wheat one-third less, corn and oats one-third better, clover and flaxseed same.	Wheat 6 bush. per acre, corn 80, oats 55, clover 2⅓, flaxseed 10.
Athens,......	Corn more, wheat 30 pr. ct. less, hay, oats and wool same.	Average better.	Wheat 12, corn 40, oats 25, hay one-half ton.
Belmont,.....	Wheat ½ or ⅓ less, oats ¼ more, corn ½ more, barley less, buckwheat same, potatoes less.	Wheat equal. All other except barley better.	Wheat 12 bush. corn 35 or 40, oats 30, barley 25, buckwheat 12.
Brown,......	Wheat less, corn and tobacco same in quantity and better in quality.	Wheat less, corn and tobacco more.	Wheat 15 bush., corn 50, tobacco 1200 lbs.
Butler,.......	Corn more, oats, barley more, wheat better quality, less quantity.	Rather above an average except wheat.	Wheat 5, corn 50 bush. barley and oats 30.
Carroll,......	About one-half crops, quality good.	About equal.	Wheat 12, rye 20, oats 40, flaxseed 20.
Champaign,...			
Clark,.......	Wheat one-half less, corn more, grass same.	Wheat less, corn about the same.	Wheat 10 bush., corn 25, grass 1½ tons.
Clermont,....	All better except wheat.	All equal, corn superior.	Wheat 10, corn 50, oats 25, hay 1 ton pr. acre.
Clinton,......	Wheat ½ less, corn same, grass and oats more, great yield.	Wheat less, corn, oats and hay more.	Wheat 8 or 10 bush. corn 50, oats 30.
Columbiana,..	Wheat less, wool same, pork 25, 33 per cent. more.	Wheat less, other crops an average.	Wheat 10, corn 40 to 50, oats 50.
Coshocton,....	Wheat nine-tenths less, corn one-fourth less, oats more, potatoes failure, apples less.	Wheat, potatoes, apples three-fourths less, other crops full average.	Wheat 2, corn 40, oats 40.
Crawford,....	Wheat less, oats & corn same, cloverseed less, grass more.	Average yield 25 to 30 per ct. greater.	Wheat 20, corn 40, oats 35, grass 2 tons.
Cuyahoga,....	Wheat one-half less, corn same, grass same, oats more, potatoes less.	Average full equal.	Wheat 8, corn 35, oats 45, hay 1½ tons pr. acre.
Defiance,.....	Wheat less quantity, qual. better, other crops never better.	Yield and quality much improved.	Wheat 25, corn 40, oats 40, hay 2½ tons.
Delaware,....	Wheat less, corn less, potatoes much less, oats, hay and flaxseed same.	Corn same, wheat less, oats and hay more.	Wheat 6 or 7, corn 30, oats 35, hay 2 tons.
Fairfield,.....	All crops except wheat better.	Average better, except wheat & potatoes.	Wheat 5 to 25, corn 40, oats 25, hay 1 to 2 tons.
Fayette,......	Nearly the same, wheat perhaps a little less.	Rather better on the whole.	Wheat 10, corn 45, oats 30, potatoes 80.
Franklin,.....			
Geauga,......	Wheat, potatoes, barley, peppermint and fruit less, corn equal, oats & buckwheat more & beter, other crops same.	Wheat, potatoes, barley, peppermint, peas same, other crops more.	Corn 83, potatoes 40, oil of perpermint 10 bbls.
Guernsey,....	Wheat less, corn same.	Wheat below, other crops about the same.	Wheat 10, flaxseed 10, barley 14, b'wheat 20.
Hamilton,....			Wheat 12, corn 45.
Hardin,......	Crops generally one-quarter more. corn not so good.	Above an average.	Wheat 20, corn 40, oats 40.

Harrison,.....	Wheat one-half less, corn more, oats and cloverseed twice yield last year.	Less of wheat, other crops more than an average.	Wheat 14, corn 40, oats 40.
Highland, ...	Wheat one-half, corn one-third more.	Wheat one-third less, corn $\frac{1}{3}$ more.	Wheat per acre $7\frac{1}{2}$ bush., corn 45.
Hocking,.....	Wheat one-half less in quantity, quality same.	Three-fifths of last 10 years, three-fourths of 5 years.	Wheat 7 to 8, corn 40, tobacco 400 lbs., oats 25, rye 10 to 12.
Holmes,......	Wheat one-third less, corn one-quarter more, hay same, oats one-fourth more, potatoes, rye, barley same.	Wheat same, corn $\frac{1}{3}$ more, hay and oats $\frac{1}{4}$ more, potatoes less, rye same.	Wheat 12 bush., corn 60, oats 40, potatoes 150, rye 30, barley 40.
Huron,.......	Wheat $\frac{1}{3}$ less quantity, $\frac{1}{4}$ better quality, corn $\frac{1}{4}$ more, oats $\frac{1}{4}$ better, hay same.	Wheat same, corn one-third better, hay and oats one-quarter more.	Wheat 12, corn 60, hay 2 tons, oats 40, potatoes 150.
Jefferson,.....	Wheat $\frac{1}{2}$ less, corn, rye, oats, barley equal, wool better.	Wheat less, other crops except potatoes more.	Wheat 7, corn 50, oats 40, rye 20.
Knox, ...	Wheat one-half less.	Except 1846, less than an average.	Wheat 8 bushles, corn 40 to 45.
Lake,........	Wheat less, corn more, oats more, barley and rye same, potatoes less.	Average 5 bushels per acre, more except wheat.	Wheat 12, corn 65, oats 40, barley 30, rye 20.
Lawrence,....	All better except hay and fruit, corn extra, wheat very good quality.	Corn, wheat and oats much better, hay an average.	Wheat 15, corn 55, oats 30, potatoes 150.
Licking,......	Wheat three-quarters less, corn same, potatoes a failure, other crop same.	Wheat less, corn same, other crops equal.	Wheat 5 or 6, corn 30 or 35, oats 30, barley 25.
Logan,.......	Wheat one-third less, other crops the same.	Average the same except wheat.	Wheat 10, corn 35, rye 15, oats 35, hay $1\frac{1}{2}$ tons.
Lorain,.......	Wheat less grain, more quality, oats and hay more, potatoes good.	Better than an average crop.	Wheat 12 to 15, corn 40, oats 30, hay 1 ton per acre.
Madison,.....	Hay and oats equal, corn much less.	Avge. about the same except corn better.	Corn 35, oats 25, hay $1\frac{1}{2}$ tons per acre.
Mahoning,....	Crops equal except wheat and potatoes.	More than an average except wheat and potatoes.	Wheat 9, corn 50, oats 40, flaxseed 8.
Medina,......	Wheat and potatoes poor, others good.	Wht. & potatoes below, other crop above.	Wheat 6, corn 40, oats 40, rye 20, potatoes 50.
Meigs, ...	Wheat less, oats less, corn more, potatoes the same.	Average greater and superior quality.	Wheat 10 bush. per acre, oats 25, corn 40.
Miami,.......	Somewhat better, corn not so good, wheat sup'r quality.	Average better.	Corn 45, wheat 17, oats 35, flaxseed 15.
Montgomery, .	Wheat less in grain, better quality, other crops same.	Balance of crops except wheat more than an average.	Wheat 10, corn 60, rye 15, oats 30, barley 30, tobacco 1200 lbs. per acre.
Morgan,......	Hay, oats, corn and cloverseed, more and better, wheat less in quan., quality sup'r potatoes more than $\frac{1}{2}$ less.	Corn, oats and cloverseed more.	Corn 40 bushels, wheat 12 or 15, oats 25, hay $1\frac{1}{2}$ tons.
Muskingum, ..	Wheat one-half less, corn and pork 50 per cent. greater.	Wheat less, other crops above an average.	Wheat 8, corn 45, 50 bushels per acre.
Ottawa,......	Wheat less, other crops probably better.	Above an average except wheat.	
Paulding,.....			
Perry,.......	Wheat one-half less, corn same, pork and butter more, wool more, tobacco less.		
Pickaway,....	Corn 10 or 15 per cent. better, wheat and grass less.	Corn 15 to 20 per ct. better, wheat and grass the same.	Corn 60 bush. to the acre.

Abstract of the Farm Crops of Ohio for 1847.—Continued.

Counties.	Crops of 1847, compared with those of 1846.	Compared with average of past 5 years.	Average yield per acre (good cultivation.)
Portage,......	Wheat and rye less, all others compare well.	Wheat and rye one-third less, others a full average.	Wheat 10, corn 40, oats 40, rye 8, potatoes 200.
Putnam,......			
Richland, ...	Wheat less, corn equal, oats same.	Wheat less, other crops a full average.	Wheat 12, corn 40, oats 40.
Ross, ...			
Sciota,.......	Wheat and oats rather less, corn, hay and potatoes about the same.	About an average for the last 10 years.	No returns.
Shelby,.......			
Stark,........	Wheat two-thirds less, other crops about the same.	Wheat one-half, other crops above.	Wheat 6, corn 40, oats 40, barley 35, potatoes 150.
Summit,......	Wheat less, corn and oats the same, apples same, potatoes one-half less.		Wheat per acre 7 bushels, oats 40, corn 42.
Trumbull, ...	Wheat much less, corn, rye, flaxseed and potatoes same, oats good.	Average.	Wheat 15, corn and oats 35 to 40, grass good.
Tuscarawas, ..	Wheat less, corn better, buckwheat better, other crops about the same.	Wheat less, other crops about an average.	Wheat 7 to 12, corn 40 to 60.
Union,........	Amount less, quality inferior.	Average superior.	Wheat 10, corn 50, oats 40, hay 1½ to 2 tons.
Washington, ..	Corn more, wheat same, potatoes same, oats less, hay less.	Except hay and fruit about the same.	Wheat 12, corn 40 bush., potatoes 100, oats 25.
Wayne,.......			
Wood,........	Wheat one-eighth less, corn one-half less, hay, oats, buckwheat and potatoes same.	Except corn about the same.	Wheat 17, corn 12, oats 20, buckwheat 25, potatoes 20 bush.

WALWORTH COUNTY, Wisconsin, 1847.

Number of acres of wheat harvested	41,779	
Average amount per acre, twenty bushels	20	
	835,580	bush.
Average price per bushel	68	cts.
Total value of wheat raised in the county	$568,194 40	
Amount used for bread, five bushels to individual	66,310	bush.
Amount used for seeding (1½ bushels per acre) spring and fall	60,000	"
Number of bushels in the county to be sent off	709,270	"
Cash value at home, of surplus amount at 68 cts	$482,303 60	

Time of sowing from the 10th to the 25th of September for winter, and from the 1st to the 20th of April for spring.

Kinds raised—red chaff, ball, crate and white flint. The red and the white flint the best for old land, it not being affected by the rust. For spring the kinds now raised are the hedgerow, a heavy, harsh bearded wheat, and the Mediterranean or Red Sea. The Mediterranean or Red Sea, yielding from 25 to 40 bushels to the acre, wheat of fine quality, but apt to lodge about harvest time, while the hedgerow stands stiff.

Number of acres of oats	9,852
Number of bushels per acre	45
Total amount of bushels	443,340

Oats generally used for home consumption.

Number of acres of corn	12,128
Number of bushels per acre	30
Total number of bushels	363,840

Corn generally used for fattening pork, &c.

The usual yield for corn in the county is from 45 to 65 bushels to the acre, the small amount raised this year is owing to the cold backward season.

Number of acres of barley	2,070
Number of bushels per acre	30
Total number of bushels	62,100

Barley used for feeding principally (no brewery in the vicinity.)

Number of acres of buckwheat	397
Number of bushels to the acre	30
Total number of bushels	11,910

Buckwheat used for home consumption.

Number of acres of potatoes	1,601
Number of bushels per acre	200
Total number of bushels	320,200

Potatoes all used at home.

Number of acres of tame grass, (timothy and clover,)...	5,198
" tons to the acre,	2½
	10,396
	2,599
Total number of tons,	12,995

Wild grass and oats straw generally used by farmers for feeding and but little tame grass yet used for pasturage. Our wild grass is fit for pasturage, commencing from the twentieth of April to the tenth of May, in the spring, and ending from the first to the twentieth of October, in the fall.

Number of acres of broom corn,	450
" pounds of brush per acre,	700
	315,000
Value of brush per lb.,	3 c.
	$9,450 00

About one-half of the brush raised this year, after being cleaned of the seed, is shipped to the eastern market, and the balance is made into brooms and sold to the merchants about the country and at the lake ports.

No. of acres of flax	75
Bushels of seed to the acre	20
Total number of bushels	1,500

In general there is no use made of the lint of the flax, the seed being the object, which is generally sent off and exchanged for oil.

Mustard seed, English white	640	bushels.
" " " brown	65	"

Amount to the acre, from eight to fourteen bushels of the white and about eight of the brown.

Mustard seed is shipped east on account of raisers shippers, making an advance of about $2 00 per bushel.

Number of working oxen	4,293
Average value per head	$20 00
Total value	$85,860 00
Number of milch cows	5,908
Average value per head	$12 00
Total value	$70,890 00
Number of young cattle including all under three years old	11,875
Average value per head	$65 00
Total value	$152,100 00
Number of young horses including all under three years old	734
Average value per head	$25 00
Total value	$18,350 00

Number of sheep	18,448
Average value per head	$1 00
Total value	$18,448 00

Average amount of wool per head, two and a half pounds.

There are few choice sheep in the county. Chas. M. Goodsell, of the town of Geneva, has a small lot that are from Mr. Jewett's stock (Vermont.) A three year old buck sent to Mr. Goodsell, from Vermont, two years since, gave this year nine and five-sixteenth pounds of well washed wool, very white and clear from gum, (the clip ten days short of a year's growth.) Three ewes (which were sent with the buck) two of which dropped their lambs in January, (which lambs came through the winter fine) averaged five and four-sixteenth pounds each well washed wool. Goodsell has ten of the full bloods, one buck and their ewes sent from Vermont, and six lambs, one and two years old. The ten gave this year an average of five and two-sixteenth pounds per clip. They have run in common with a flock of about seventy common sheep, all sharing alike. The full bloods came out in the spring, plumper and better than the common sheep, all sharing alike. They were kept on common wild hay, with a gill of corn per day to each of the flock.

Number of hogs (old and young)	27,145
Say one-half butchered this fall	13,572
Average weight per hog	220 lbs.
Whole number of pounds	2,985,840
Value at home per pound	2 cts.
Value of whole amount of pork at home	$59,716 80
Aount of pork needed for home consumption, allowing forty pounds to each individual	610,480 lbs.
Amount for exportation	2,361,200 lbs.
Value at home per pound	2 cts.
Total value of pork for exportation	$47,242 00

Price of farm labor (by the year) twelve dollars per month. By the day in harvest, from one dollar to one dollar and fifty cents per day. Female (domestic) one dollar per week. Mechanics (average) twenty dollars per month. Average price per bushel for carrying wheat to market, eleven cents. Average price for carrying pork to market, twenty cents per hundred.

Respectfully submitted, by

WM. R. MAY.

Wheelock, Robertson Co., Texas, Oct. 23, 1847.

E. Burke, Commissioner of Patents:

Dear Sir:—I herewith transmit to you an estimate, as near as can be made of the number and quantity of stock and produce raised, and on hand in the counties of Brassos, Robertson, Leon, Limestone and Navarro, in the state of Texas, in the year 1847. I would state that these counties are thinly peopled.

Brassos county lies between the Nasaroto and Brassos rivers, south of the

San Antonio road, and has been settled about twenty years; but the population has not increased for the last five years.

Robertson county lies north of the San Antonio road, between the Narasoto on the east and the Brassos on the west. This county has been settled about fifteen years.

Leon lies east of Robertson between the Narasoto and Trinity, north of the San Antonio road, and has been settled about eight years.

Limestone lies north of Robertson and Leon, and reaches from the Brassos to the Trinity, and has been settled from 4 to 12 years.

Navarro lies north of Limestone, and also extends from the Brassos to the Trinity, and has been settled about four or five years.

The three last named counties are increasing in population. I send you the best information that can be obtained, but cannot give a statement compared with the produce of 1845, with any degree of correctness.

The statement for this year can be relied as tolerably correct.

The raising of cattle, sheep, horses, mules, hogs, corn, (maize,) cotton, wheat, oats and vegetables, in all these counties is on the increase. Price of freight by land $1 00 per 100 miles, and at that rate generally for a greater or less distance. Wages of agricultural labor $10 to $12 per month. Mechanical labor, $1 00 to 2 00 a day with board.

Respectfully your ob't serv't,
S. W. KELLOGG.

Estimated number of cattle, horses, &c., and amount of produce for the county of Brassos for 1847:—

Number of bales of cotton, of 500 lbs. each,	245	
“ bushels of corn, (maize,)......	40,000,	price 25 to 37½ cts.
“ “ oats,..............	300	37½
“ “ sweet potatoes,.....	3,250	37½ to 50
“ “ wheat,............	00	
“ “ rye,...............	100	75 “
“ horses and mules about........	300	
“ cattle,...........“..........	5,000	
“ sheep,......................	100	
“ hogs,.......................	4,000,	$3 50 per 100 lbs.

Price of beef on foot $1 50 per 100 lbs.

Prices estimated in October of this year, (1847.)

Estimate for Robertson county, 1847:—

Number of bales of cotton, of 500 lbs. each,	225	Price.
“ bushels of corn,...............	4,500	30 to 37½ cents.
“ “ wheat,.............	60	
“ “ oats,..............	700	37½
“ “ sweet potatoes,......	4,000	25 to 50
“ “ rye,...............	150	75
“ horses and mules,.............	471	
“ cattle,.......................	8,477	
“ hogs,.......................	5,200,	$3 50 per 100 lbs.
“ sheep,.......................	430,	increasing.

Price of beef $1 50 per 100 lbs. on foot.

Statement for Leon county, 1847:—

Number of bales of cotton, of 500 lbs. each,	450	
" bushels of corn,	43,000,	price 50 cents.
" " wheat,	100	" $1 50 pr. bush.
" " oats,	200	" 50 "
" " rye,	200	" 75 "
" " sweet potatoes,	8,000	" 50 "
" horses and mules,	600	
" sheep,	1,000	
" hogs,	5,000	
" cattle,	6,500	

Beef $1 50 per 100 lbs. on foot.

Statement for Limestone county, 1847:—

Number of bales of cotton, of 500 lbs. each,	200	
" of bushels of corn,	75,000,	price 50 to 75 cts.
" " wheat,	200	" $1 50 pr. bush.
" " oats,	100	" 50 cents.
" " rye,	300	" 75 "
" " sweet potatoes,	13,000,	37½ to 50 "
" horses and mules,	1,558	
" cattle,	9,548	
" hogs,	4,327,	$4 to $5 per 100.
" sheep,	1,228	

Price of beef $2 00 to $2 50 on foot.

APPENDIX No. 3.

LETTERS, &c. ON COST OF RAISING WHEAT AND INDIAN CORN.

My Dear Sir:—In compliance with your request to procure accurate estimates of the cost of producing crops of wheat and Indian corn in the vicinity of my residence, I herewith transmit my estimates of the same with a succession of hay crops until the ground again requires to be ploughed for corn and wheat.

Seed corn one-fourth bushel per acre, worth,	$ 50
Interest on land,	1 50
Ploughing,	3 00
Planting,	2 00
Hoeing,	2 00
Harvesting,	2 00
Threshing,	1 00
Manure,	8 00
Total cost,	$20 00

Average crop forty bushels.

Worth 75 cents per bushel—value $30 00 product.
Cost 20 00

$10 00 gain.

Wheat next year, two bushels per acre when prepared for sowing worth,	$4 00
Interest on land,	2 00
Ploughing,	2 00
Harrowing,	1 00
Harvesting,	5 00
Threshing,	2 50
Manure,	7 00
Cost,	$22 00

Average worth, $1 34. Value of 20 bushels, $26 80
Cost, 22 00

Gain per acre, $4 00

One ton of hay per acre annually for ten successive years, one-fourth clover seed sown with the wheat, worth	$ 75
Interest on land for ten years,	15 00
Manure,	9 00
Harvesting,	20 00
Total cost,	10)44 75
Cost per ton,	$4 47

Average worth, $6 00 per ton—value of 10 ton,	$60 00
Cost,	44 75
Gain on hay,	15 25
" " wheat,	4 80
" " corn,	10 00
Gain for twelve years per acre,	$30 05

If we deduct the value of the corn fodder which I estimate at four dollars it will reduce the cost to forty cents per bushel, also the wheat straw is estimated at two dollars, which would reduce the cost to one dollar per bushel. In preparing the ground for corn about forty loads of manure to the acre is required to make a succession of good crops which I estimate at fifty cents per load, and expense of putting it upon the land at four dollars, ($24) therefore eight dollars of which is estimated for the corn, seven for whea and nine for the hay crop.

By treating our poor soil in this way it would probably produce good crops indefinitely. Respectfully, your friend,

HARVEY HUNTOON

Hon. Edmund Burke.
Unity, N. H. Nov. 22d, 1847.

Bethlem, Litchfield Co., Conn.

To Hon. Edmund Burke, Commissioner of Patents.

Sir:—The Hon. T. Smith handed to me some time since a circular issued from the Patent Office requesting information as to cost of producing wheat and Indian corn to which I should have sooner attended had I not mislaid the communication.

Indian Corn.

Preparing the ground for seed by manuring, ploughing, &c.	$8 00
Tending, gathering seed	25
Threshing, &c	7 00
Interest on land	3 00
	$18 25=36.5

Number of bushels to the acre 50. Making the cost of raising a bushel of Indian corn, 36$\frac{5}{10}$ cts.

There is no wheat raised in this vicinity, and but little in the state. I could give no accurate information respecting it. Any further information requested will be willingly given.

Your obedient servant,
JOHN C. AMBLER.

Binghampton, N. Y., Oct. 16th, 1837.

Hon. D. S. Dickenson.

Dear Sir:—I will give you the result of my experience and observation respecting the cost of producing crops of wheat and Indian corn, in this vicinity.

I estimate the value of our wheat lands, in a good state for a crop, at twenty dollars per acre.

Interest on this at 6 per cent	$1 20
Three ploughings	4 50
Harrowing thoroughly	2 25
One and a half bushels of seed and sowing	1 68
Harvesting with a cradle	1 00
Threshing and cleaning	2 00
	$12 63

I estimate the average yield on good land, well tilled at twenty bushels per acre, making the cost sixty-three cents and a fraction per bushel.

I have made no account of the value of the straw, or of gathering the crop into the barn, or of tending it while growing, because in stating the value of the land I suppose it to be well fenced, and that the crop will cost nothing in tending, and the straw for cattle fodder and for making manure, is worth more than barn room, cartage from the field, &c.

The average crop, agreeably to my statement may be greater than the yield of many fields, half tilled, and sown at an unseasonable time, but I am confident that I have not *overrated* the production, on an average, of good farms in this county, which receive the culture which I have contemplated in my estimate of expense.

Our corn land I would call worth twenty-five dollars per acre.

Interest on which is	$1 60
Once ploughing with double team	2 00
Harrowing	1 50
Seed and planting	1 00
Plaster and putting on the hill	37
Ploughing and hoeing twice	2 00
Cutting by the roots and stacking	75
Husking and threshing	2 50
	$11 62

Average yield, forty bushels. Cost of production twenty-nine cents.

In this amount I have put down nothing for manuring or hauling, because the fodder obtained from this crop, being cut up when the kernel begins to harden, in the way now universally adopted here, and carefully saved is worth as much as a moderate crop of hay made from the same quantity of land; and produces as much manure as is needed for future crops.

Perhaps I ought to explain the fact that it costs less to prepare ground for corn than for wheat. The most approved mode of raising a corn crop is, to plant on sward ground, ploughing it but once and turning the upper side perfectly under—then harrowing lengthwise until a good tilth is produced. When the soil is not rich enough, stable manure is first spread on the land.

I would also explain my putting the value of corn land higher than wheat land, by remarking that our river bottom, and the adjacent grounds, are the best for corn, and are more valued, though back and more elevated land produce more and better wheat, being less liable to rust and shrinking.

Very respectfully your friend,

A. DOUBLEDAY.

One acre of land that will yield fifteen bushels of wheat, costs at this time thirty-three dollars thirty-three and a third cents.

Interest thereon, at six per cent. per annum	$2 00
Cost of ploughing, sowing and harrowing	1 50
" seed	1 00
Gathering and threshing	1 50
Total expense of raising fifteen bushels of wheat,	$6 00

Average expense per bushel, forty cents.

One acre of land that will yield forty bushels of corn, will cost at this time, thirty-three dollars and thirty-three and one-third cents.

Interest thereon at six per cent. per annum	$2 00
Cost of ploughing, harrowing and furrowing out	1 50
Cost of planting the same, and seed for ditto	25
After culture	1 75
Husking and cribbing the yield of one acre	1 00
Total expense of raising forty bushels	$6 50

Average expense of one bushel sixteen and a quarter cents.

George Township, Fayette Co. Penna., Oct. 21st, 1847.

JONESVILLE, *Michigan, November 8th*, 1847.

Sir: I have the honor to acknowledge the receipt of your circular of September 1st, 1847, through Hon. Robert McClelland, and in answer thereto, submit the following:

The average price per acre of our improved wheat lands is	$10 00
Interest on which, at six per cent	60
Preparing ground for seed, and dragging two days with team each acre, at $1 00 per day,	2 00
Seed, one and a half bushels per acre, at sixty cts	90
Cutting and gathering per acre,	1 25
Threshing and cleaning twenty bushels, average per acre, ordinary crop, at six cents per bushel,	1 25
	$6 00

Which, divided by twenty, the average number of bushels per acre, under prudent husbandry makes the cost per bushel at 30 cents.

This statement will apply to about three-fourths of the wheat crop of this state, in ordinary seasons. The remaining one-fourth, for want of proper husbandry, good fences and timely preparation of the soil, may be put down at an average of thirteen bushels per acre, which, for interest on land, preparation, seed, harvesting, &c., at the same cost of $6 per acre, would be, at a cost, per bushel, of forty six cents. Calculating, therefore, three-fourths of the crop at thirty cents per bushel, and one-fourth at forty-six cents, and the average of the whole crop would be thirty-four cts. per bushel.

In 1845, three-fourths of the crop produced thirty bushels per acre and one-fourth about eighteen bushels per acre, with the ordinary cost per acre of $6.

Cost, per bushel, of three-fourths of a crop of 1845, twenty cents—cost of remaining one-fourth, thirty-three cents, three mills.

Average cost of crop of 1845, twenty-three cents, three mills per bushel.

The first estimate above, would be a fair average of the crop and cost for the past ten years, during which time I have resided here. For three years of the time the crop has been above that estimate and three years it has been less.

The principal ingredients of the soil are sand, gravel and loam, with a large proportion of lime, on the openings and prairies, and those, together with a vegetable mould in the timbered lands.

When first broken up, the openings particularly, present a yellowish, sandy, and to some persons not acquainted with the ingredients or geology of the soil, a poor appearance. The subsequent action of the sun, frost and rain, produces a decomposition of the lime, with which it is so strongly impregnated and it assumes a dark chesnut or chocolate color, and in some instances it becomes almost black. The same composition enters into the soil from the surface, until you come to the second stratum of gravel containing water or sandstone, usually at a depth of from ten to twenty feet, and sometimes even beyond the latter depth.

That this composition forms the surface soil to those depths is evident from the fact, that the earth thrown out from cellars, wells and other excavations, after remaining until acted upon by the sun, frost and rain, produces vines and grain equally well with that which has been "brought to" by the plough without further preparation.

In but a small portion of the lower peninsula of this state does clay form any considerable portion of the soil, and this accounts, in a great measure, for the reason that so much less team work is required in preparing the ground for seed—the soil being such, that when the vegetable matter is kept down there is no tendency to "*cake*," as it is termed, and in most cases it is sufficiently dry within twelve hours after a long rain to work to advantage.

When the land becomes impoverished by a succession of crops, bad husbandry or any other cause, the simple method of ploughing deeper, or sub-soil ploughing, is all that is necessary to restore it, and this only, when the farmer neglects rotation of crops, clover and plaster, or refuses to return to the land, in manure, the crops which he has taken from it.

Our farmers have commenced the business of wool growing, and so far as it has been tested, in addition to the profits from the wool, it is found very much to cheapen the raising of wheat.

The experience of our best farmers agrees, that when a sufficient number of sheep is put upon a fallow, two ploughings are as good as three without them; and in this manner the average cost of keeping sheep, per head, for a year, is estimated not to exceed twenty-five cents.

The following is submitted as the estimated cost of raising Indian corn:

Interest on land at ten dollars per acre,..................	$ 60
Ploughing, &c., one and a half days, at one dollar per day,	1 50
Ploughing and hoeing corn, one and a half day, at 5*s*. pr. day	94
Harvesting,..	1 00
Shelling—four cts. pr. bushel, thirty bushels—average per acre,..	1 20
	5 24

Making 17 $\frac{14}{30}$ cents per bushel, as the cost of raising Indian corn.

I have thus briefly given you my views upon the subjects embraced in your circular, and will be happy at any time to give any information in my power that may add to the very useful report that annually emanates from the Patent Office. Very truly, your obedient servant,

W. T. HOWELL.

WHEAT CROP OF 1847.

PLYMOUTH, Oct. 26th, 1847.

Dear Sir:—After tendering the highest regards, an answer to the following questions will be forwarded to you.

1st. The interest on the present value of land per acre on which the crop is grown at 6 per cent.

2d. The cost of preparing the ground for the seed.

3d. The cost of the seed.

4th. The expense of tending, gathering, threshing and preparing for the market.

In answer to the foregoing questions, it may be stated that lands in Michigan vary much in *price*, even of the same quality, consequent upon improvement and locality. The value of farming lands range from $1 25 to some thirty or forty dollars per acre. The cost of clearing and fencing over timbered openings, will range from $8 to $12 per acre, and these lands compose the great majority of the land now in cultivation. The prairies and plains may be brought into cultivation for a less sum than the lands above described, and they compose but a limited portion when compared with them, so that a supposed valuation will be made, after taking into consideration a general view of the whole subject. Therefore, $10 will form a principal to cast interest on, and as it requires two seasons to mature a wheat crop of the kind raised mostly here—

1st. Two years' interest may be cast on $10,............	$1 20
2d. The cost of ploughing, sowing and harrowing,.......	4 50
3d. The cost of seed, one and a half bushels per acre,....	1 40
4th. The cost of harvesting,..............................	1 50
For threshing and cleaning for market,...............	1 50
	$10 10

Average crop this year per acre fifteen bushels. 15÷$10 10=67 $\frac{5}{15}$

CORN CROP, 1847.

Interest on land at 6 per cent. per acre,................	$ 60
Ploughing and harrowing per acre,.......................	1 50
Planting two days, at seventy-five cents per day,........	1 50
Cultivating and ploughing,...............................	1 00
Hoeing two days,..	1 50
Harvesting and shelling,..................................	2 25
	$8 35

Average crop 50 bushels per acre; value per bushel 30 cts

OAT CROP, 1847.

Interest at 6 per cent. on land,	$ 60
Ploughing land per acre,	1 50
Sowing and harrowing,	1 50
Harvesting and threshing,	2 00
Seed, two bushels per acre,	50
	$6 10

Oats selling at 20 cts. per bushel.

Average yield this year 40 bushels per acre, as you will see no mention made of manure which is set off against the fodder.

That attention is not paid here to manure and seeding which is in the eastern states. The state is new and speedily undergoing the preparation for manure and seeding to clover.

With the highest esteem, respectfully and truly your friend,

Hon. R. McClelland. J. SHEARER.

P. S. By this report the wheat crop falls below the general average crop of our state, from a close examination, by even passing through many wheat fields in several counties of Michigan, and comparing this year's crop with other years, 15 bushels to the acre as an average amount is thought full high enough. The past season has been very favorable to the growth of corn and oats. J. Shearer.

La Salle, *Monroe Co. Mich.*
October 26th, 1847.

Hon. R. McClelland:

In answer to inquiries from the United States Patent Office, inclosed in your letter of the 16th inst., relative to the cost of raising wheat and Indian corn in this vicinity, I send you the following estimates for one acre of each.

WHEAT.

Interest at 6 per cent., on one acre of land at $15,	$ 90	
Twice ploughing the same	2 00	
Twice harrowing do.	50	
One and one-third bush. seed wheat, at 6*s* pr. bush.	1 00	
Sowing and harrowing in	50	
Furrowing and cleaning furrows	50	
Harvesting, &c.	1 50	
Threshing and cleaning, (by Pitt's separater,)	2 00	=$8 90

An acre thus managed may be safely estimated to yield twenty-five bushels, ($8 90÷25=$36\frac{4}{5}$) at the cost of $36\frac{4}{5}$ cts. per bushel. The above may, perhaps, sound somewhat theoretical, but in practice it will be found nearly correct. In proof I offer, gratuitously perhaps, the cost of each year's crop with the yield per acre, drawn from accounts carefully kept from the year 1839 to the year 1846, inclusive

1839,	cost	27½	cents,	average	yield	44⅛	bushels.	
1840,	"	32⅕	"	"	"	$24\frac{1}{32}$	"	
1841,	"	28	"	"	"	$27\frac{1}{16}$	"	
1842,	"	$34\frac{1}{10}$	"	"	"	22	"	
1843,	"	29⅓	"	"	"	28½	"	
1844,	"	56	"	"	"	12½	"	A partial failure by fly.
1845,	"	33⅓	"	"	"	26⅛	"	
1846,	"	38	"	"	"	$18\frac{1}{32}$	"	Injured by rust

In my estimate there is no charge for manuring. I cannot say that the crop would not be greatly increased by a judicious application of manure; but the prevailing opinion is that it tends to promote too great a growth of straw at the expense of the grain.

CORN.

Interest on one acre of land, at $15 per acre, 6 pr. ct. 6 months,	$ 45
One ploughing sward, clover-lea, or stubble	1 00
Harrowing and furrowing	50
Seed and planting	37½
Cultivating and hoeing, first time	50
Twice cultivating	50
Husking on the hill	1 00
Shelling and cleaning	1 50
	$5 82½

An acre thus managed will yield fifty bushels (5 82½÷50=11⅗ cents) at the cost of 11⅗ cents per bushel. In this crop manure is seldom used. This fact, however, discreditable to the intelligence of the mass of our farmers, speaks volumes in proof of the enduring fertility of our soil, which thus unaided, continues to yield an undiminished tribute to the cultivator. I regret that I have never kept an accurate account with the corn crop as it is soon likely to rival the wheat crop in importance in this section, I intended to have said something in reference to the barley crop when I commenced this, as a fore crop for wheat, but as this communication has far exceeded its proper limits already, I must omit it.

Very respectfully, yours,

S. M. BARTLETT.

ASHTABULA, *Oct. 21st*, 1847.

HON. J. R. GIDDINGS,

Dear Sir: Yours with enquiries of the Commissioner of Patents, as to the expense of raising wheat and corn in my vicinity, is before me. In reply: it is difficult to arrive at accuracy in a country like this where grain growing is not the main reliance of the farmer, and where it is uncommon for any one to adopt, year after year, the same system.

Most of our farmers raise wheat for their own consumption only adopting at different times, sometimes a naked summer fallow and at others fallowing wheat after all corn, potatoes, &c., and occasionally turning in a green crop, such as clover. On farms where much wheat is raised, a naked summer fallow is as elsewhere the most common system adopted.

Under the latter system the profits are (without rendering an excess of cost over the others) much greater. Still it is disputable what system is the best as under the other the profits of a spring crop must enter into the estimate as credit, subject however to the loss to the land by two crops instead of one.

Considering a naked summer fallow as the most common method elsewhere, it will I presume be most satisfactory to base my estimates on this system.

In the case of corn, my estimates are based on a supposed case where land is so cultivated as to remain in about the same condition ; the soil such as on the whole is most natural for corn, that is dry land free from clay.

On mucky land the crop will exceed fifty bushels, but the expense and risk are greater. On some of our worn out land, the expense will be much more than the entire value of the crop. These variable causes will induce a wide difference in the estimates of different individuals.

Question:—What is the expense of raising a bushel of wheat in your vicinity?

Answer:—Fifty cents. Thus,

One acre.

To one-third, $5 40 value of man and labor of manuring it,	$1 80
Interest on $20, two years,	2 40
Ploughing once,	1 50
Harrowing four times,	2 00
Rolling,	50
One and a half bushel of seed,	1 50
Sowing,	25
Harvesting,	1 50
	$11 45

Cr. by $22\frac{90}{100}$ bushels, (average.)

Any of our rolling lands with stumps and under the above system will yield from fifteen to thirty-five bushels, while under the other the average is not over ten. The use of the land for sheep during the two years, while the crop is off and also sometimes feeding the lambs, are not taken into view.

What is the cost of raising a bushel of corn? Twenty cents. Thus:

Interest one year on $20,	$1 20
Manure as above,	1 80
Once ploughing,	1 50
Second harrowing,	1 00
Planting,	1 50
Cultivating with man and horse,	3 00
	$10 00

Cr. by fifty bushels, (average.)

Note.—If the expense of harvesting and stock is included say, $1 75, the amount will be swelled but we do not generally estimate them as the shucks and pumpkins will generally serve them over the last. The same allowance is made in the case of wheat. The straw pays six per cent. on the threshing, &c. Yours, respectfully,

R. W. GRISWALD.

Washington City, *April 28th,* 1846.

Dear Sir: I have yours of the 27th. As a general remark it is true that wheat can be produced upon prairie land at an expense of not exceeding twenty-five cents per acre, in good seasons when no misfortune befalls the crop. Some seasons the blight cuts off the entire crop. Wheat does not grow two years in succession upon the same land, every alternate year you must either substitute a rotation of crops, or allow the land to lie idle which is most generally done. Each prairie farmer must own a sufficient quantity of timber for the purposes of fencing and building. There are three considerations with many of less importance which contribute to swell the average expense of producing wheat on the western prairies to probably thirty-five cents per bushel.

I subjoin the expenses of an acre without the cost of the land, for the first crop. For subsequent crops the ploughing would be fifty cents per acre.

For ploughing an acre of sod,........................	$2 00
One and a half bushels of seed,....................	1 00
Putting in,..	1 00
Harvesting,..	1 25
Threshing,..	1 75
Twenty miles to market,............................	2 00
	$9 00

Your enquiry however was as to the expense of production, which would be seven dollars per acre, or twenty cents per bushel, an average crop being thirty-five bushels per acre. There is no rule for estimating the interest on the capital employed, the prices of land are so varying, being from $1 25, the government price, to 30 or $40 per acre in the back countries. But you may add every possible contingency of expense, and the price of producing a bushel of wheat cannot exceed 25 cents, the sum you have suggested.

I will add here the result of an actual experiment. A gentleman purchased an eighty acre lot at $15 00 per acre, and kept an accurate account of the expenses attending the first crop including the cost of the land:

For eighty acres of land $15 00 per acre,............	$1,200 00
Fencing per acre, $2 00,............................	160 00
Ploughing,..	160 00
Seed,..	80 00
Putting in,..	100 00
Harvesting,..	100 00
Threshing,..	140 00
	$1,940 00

The crop averaged thirty-five bushels per acre and was sold at seventy cents per bushel. The expense of transportation to market was one hundred and forty dollars.

Cost of land $15, as above,..........................	$1,940 00
Transportation,..	140 00
	2,080 00
Eighty acres, 35 bushels per acre,......................	1,960 00

Another eight hundred acres were purchased at one dollar and twenty-five cents per acre, with the following result:

Eight hundred acres,	$1,000
Fencing,	1,600
Ploughing,	1,600
Seed,	800
Putting in	1,000
Harvesting,	1,000
Threshing,	1,400
Transportation,	1,000
	$9,400

Eight hundred acres, 35 bushels per acre,	$19,600.
28,000 bushels 70 cents per bushel,	

A variety of results of this kind could be given but this is deemed sufficient to answer the purposes of enquiry. There may be some errors in the figures, I have not time to look over them, but the bases of the calculation may be relied upon. Very respectfully,

THOS. J. HENLEY.

Hon. E. Burke,
Commissioner of Patents.

APPENDIX No. 4.

MAIZE IN MEXICO.

From the Vienna Zeitung—by H. Carl Heller. Translated by E. Goodrich Smith of the Patent Office.

Maize, (zea mais Linnæus,) not only on account of its elegant structure, splendid leaves, delicate inflorescence, and variety of color of its pliant stalk, is one of the most beautiful of the grass kind, but likewise one of the most useful, and indeed, for Mexico and a large part of America, truly the most useful of them.

Its beauty the Mexicans have at all times acknowledged; they yet here adorn the altars in the churches and chapels with the stalks of maize, in which are twined flowers. Among the ancient Mexicans, maize was a sign in the calender, and a holy ornament upon their groves.

The Incas of Peru cultivated maize in their gardens as elegant plants, and among artistic works in gold of the ancient Peruvians the imitations of the maize plant are the most admirable.

From what has been mentioned, the value of this plant to the inhabitants of America is evident, as well as the proof that its culture was known, and especially in Mexico, long before the discovery of the new world.

It is well established that maize was not known in Europe till after the conquest of Mexico, and we know, likewise, that Ferdinand Cortez, after his first return to the court of Charles V., 1519, among the presents from Mexico, had some ears of maize.

Notwithstanding that, we cannot certainly fix upon Mexico as the true native country of this plant, yet America was indeed so, for only the Mexicans, the inhabitants of Hayti, and some natives of South America, had any peculiar names for maize—a circumstance that is not without importance, because we may assume that an object for which any language has no designation, is of foreign origin.

Thus, for example, the Indians of Mexico have no word for wheat, barley, oats, apple, pear, grape, fig, sweet orange, &c., which they designate by the Spanish words, *trigo, sevada, avena, manzana, pera, uva, figo, narranja*, &c., but for all domestic fruits and plants they have, as *tlaolli* (zea mais,) *choyoteslle*, (lycios edulis,) *mamei*, (mameia Americana,) *pitaya*, (cactus pitoga,) *cacahuates*, (arrachis subterranea seu hypogea?) *maguey*, (agave Americana,) *jomall*, (solnum lycopersicum.)

Our word maize comes from the Haytien word *mahiz*, from whence it is formed by corruption.

The Chinese and Japanese have also a peculiar word, though it was already known among these nations before the discovery of America. Thus the Chinese call maize *ya-chu-chu*, corn of *chu* or *ya* (kidney) or *yu my*, rice resembling a kidney. The Japanese call it *nanbamthbi*, that is corn of *new bran*, or, by nick name, outlandish (foreign) corn, as the Germans, for example, call it Turkish wheat. It is, therefore, more than probable that the maize of the new world came to the old as an exchange, for had the Asiatic people carried maize to America, they would also have planted the cereals far more important for the old world. If, then, we admit that all men sprung from one stock, it must be that the first inhabitants of America separated from their Asiatic brethren before the cultivation of the cereals were known.

Notwithstanding, maize is no where found in the wild state, for as to that wild maize of Dr. Hernandez, it is very much as with his wild wheat, which he would have it he had discovered, and which he named *triticum michoucum*, but which is nothing but *triticum compositum*, and came from Europe.

We often find in Mexico, single plants of maize which grow self-sown, and flourish without culture, and though they may stand miles from any inhabited places, they cannot be considered wild, as notwithstanding the often monstrous variety, they always bear the characteristics of cultivated maize. By the parrots, for example, which come from the east, from the *terra caliento* to the *terra templada*, in large flocks, to visit the maize fields, the kernels of maize may be borne to a distance and thus sown.

It is the same with maize as with the other cereals of Asia, considered as their native country. So far we may consider America as the native country of maize; neither are those found wild.

Notwithstanding the many varieties of maize which are found in Mexico, yet there is only to be found the Linnæan species "mais." Here, in this country, indeed, we distinguish two kinds—a *maiz alto*, and a *maiz temporal*, but they present no botanical difference.

The best known cultivated varieties in Mexico are—

1. *Maiz de padus*, with small eight-rowed ears; the most unimportant of all the varieties cultivated here.

2. *Maiz manchado* or *Chinesco*. A productive kind, with white, yellow and red kernels; sometimes, also, entirely blue, in which case it is called *pinto*.

3. *Maiz blanco*. A very productive variety, which yields a fine, sweet meal.

4. *Maiz amarillo*, which is subdivided into two varieties.

(1.) *Maiz amarillo grueso*, which is more frequently cultivated, and rarely yields less than 2 to 3 ears each, with 300 to 600 kernels.

(2.) *Maiz amarillo péqueno*, which is somewhat smaller, less stout, but, in a fruitful soil, weighs 10 to 15 cwt. more than the grueso.

5. *Maiz cuarenteno*, better known in Mexico under the name of *maiz tremés*, or *olote Colorado*, which ripens quickly, and may be planted in the coldest districts in Mexico.

6. *Maiz tardio*, or *de riego*, the most productive of all the varieties, and that which is cultivated around the city of Mexico, and in many moist regions. It sometimes reaches to 500 per cent.

Maize succeeds best in a moist and warm climate, but it has the great advantage above other cereals, that it may be successfully cultivated in Mexico as well in the *terra caliente* (warm districts) as in the *terra fria* (cold ones.) Its highest limits here are from 2000 to 8000 feet above the level of the sea, therefore the time necessary for it to ripen is very different. It varies in all the periods from 7 months to 6 weeks.

Maize is the most important plant in Mexico, and the failure of the crop by drought, hail, wind, or disease, produces the saddest consequences.

The diseases of maize most known in Mexico, as well as the hurtful animals, are the following:

1. *La raquitte,* a kind of wasting consumption which affects the maize where it is sown on barren soil, and shortly after the seeding is subjected to moist cold weather.

2. *El carbon.* A vegetable carbonaceous growth, which grows in the ears, or causes the buds to be abortive. This abortion, as in the oak and other plants, appears to be produced by an insect.

3. *El hango.* A species of *uredo,* which forms itself particularly in the ear, and destroys it. This disease is here called *los cuervos,* (the raven.)

Of Animals, &c.

1. A kind of mole, (talpa,) which digs under the fields and destroys the young plants.

2. The larvæ of melolontha, *(hanctor ó gusano turco,)* which not only seizes on roots, but also often destroys the stalks and ears.

3. Many owls and phalænas. (?)

Maize may be cultivated in Mexico at different times, especially in those districts where for nine months there is sufficient moisture. In the *terra caliente,* they take the best spot lying nearest the house, cut down the trees and shrubs, burn them and plant maize.

But in the cooler districts they have two kinds of culture, that with watering and that in the dry lands, *(siembra de regadio y de secano.)* Of the latter we have again different methods, which are called *de humedó, de aventureso,* and *de temporal.*

In the *de regadio,* the kind *maiz tardió* is sown, which is the most productive, and a variety very similar to the same in a soil of constantly equalized moisture at the commencement of spring, *(de humedó.)*

A seeding which is made in a soil that has the capacity of preserving the moisture of the winter and first spring rains, is called *siembra de aventureso.*

In the *de temporal* a quickly ripening kind is sown *(maiz cuarenteno,)* which is cultivated either before, or in the rainy period, (June to November,) if before, and it is also sown on dry land, then this is called *siembra en polva, (sowing, or seed on the dust.)*

Often the Mexicans take no pains to select the soil, and frequently cultivate maize on strata or hardened clay, (tepetate,) where the crop is very small.

How much Mexico produces at the present time it is impossible to determine with any accuracy, but it is thought that it is the principal subsistence of at least five millions of persons, and at the same time, is the only corn-fodder for all the kinds of domestic animals, so that its collective product must be, at least, 10,000,000 of metzen. [As a metzen is 1.68 English bushels, this is equal to nearly 17,000,000 bushels, and it would seem must be underrating the crop.]

The different parts of the maize, and the modes in which it is used in Mexico, are the following:

A. Of the plant.

1. The ancient Mexicans made of the juice of the stalk, sugar, and the modern Mexicans, a fermented drink, named *pulque de maiz ó mayo.* Experiments, also, have succeeded in making brandy of the same. The extremely saccharine stalk is eaten raw by many Indians.

2. The unripe ears *(Ind. gilote, Span. mazorca,)* are cooked, and serve many poor people for their sole sustenance.

3. The leaves and stalks serve as excellent fodder for horses and mules.

B. Of the dry plant.

1. The stalks and leaves* are used as well for the fodder of animals as also for the construction of small houses and huts, the walls of which are made of stalks, and like roofs of houses.

2. Of the ripe corn is prepared, similar to barley, a kind of beer, *(chicha)* an agreeable and healthful drink.

3. Of the maize meal, boiled in water, and in connexion with different roots, many kinds of paste, *(atolli* or *atole,)* and a kind of bread called *arepa.*

4. The ripe kernels roasted, which are there called *esquite,* as well the meal prepared of it *(pinole)* are used often in the *terra caliente.*

5. Finally, maize is consumed in still greater quantities by the Mexicans in *tortillas*, which are prepared in the following manner:

The maize kernels are placed in a vessel with water, and softened for a time by the aid of lime. Then they are rubbed on a flat stone *(metate)* into a fine mass, and from this are formed very thin round cakes, which are baked on a thin clay plate. They are taken hot from the plate and eaten, and thus supply the place of bread to the Mexicans, to which the *tortillas* are preferred.

A Mexican woman spends daily at least six hours in the preparation of the *tortillas*, and in the whole republic, according to the estimate of H. Azcarale, are thus engaged 312,500 strong and healthy women. Were it not the sole labor of the Mexican wives, we might well cry out, what a monstrous loss of time!

Finally, I must yet mention that paper *(papel de oja de maiz)* is also made from the leaves, and the raw leaf in the south is used for the preparation of the so called straw segars, *(cigaritos.)*

This is, in brief, that which is most worthy of notice respecting maize in Mexico.

Toluca, 30th September, 1846.

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* The ends of the stalks, cut off from the ear before they are ripened, are called, Ind. *tet lazale,* the other stalks, dry on the fields, *rastrojo.* The former are taken off for fodder of horses. A field of maize is called *milpa.*

APPENDIX No. 5.

ON THE CULTURE OF POTATOES.

Experiments relating to the cultivation of Potatoes, translated from the German of Prof. Hlubek, of Gratz, by E. Goodrich Smith, of the Patent Office.

Comparative Experiments of the different kinds of manure on the growth of Potatoes, and the quantity of starch-meal contained in them.—For some years past experiments have been instituted at the experimental farm of the imperial Agricultural Society of Steiermark, as to the influence of the different kinds of manure on the growth of potatoes, beets and maize. The soil on which the experiments were tried is an aluminous clay soil, which is composed of—

50 to 52 per ct. sand, mostly gravel, with fragments of quartz, gneiss, and mica; 47 to 61 clay; 95 carbonate of lime; 92 humus.

Of every kind of manure used there were 3 parcels each for 100 square feet, therefore, in the whole 300 square feet; and the manure was applied in the year 1845. In the year 1846 each parcel was laid with 60 tubers equal in size, and weighing 6 lbs. on the 16th of April. During their growth the potatoes were twice hoed; the gathering of them was on the 12th of October, and in the month of November the quantity of starch-meal which they contained was determined in the usual manner.

The average product from the three parcels of each kind of manure was as follows:

		Product.	Diseased.	Starch.	Residuum.	Dry substance beside.
		lbs.	per ct.	per ct.	per ct.	per ct.
1	Without manure	$36\frac{22}{32}$	12	$11\frac{28}{32}$	$7\frac{16}{32}$	$19\frac{12}{32}$
2	With 52 lbs. of cowdung	$47\frac{24}{32}$	17	$10\frac{7}{32}$	$7\frac{6}{32}$	$17\frac{23}{32}$
3	“ 52 “ horsedung	$41\frac{29}{32}$	17	$11\frac{8}{32}$	$7\frac{16}{32}$	$17\frac{24}{32}$
4	“ 52 “ hogdung	$40\frac{27}{32}$	14	$10\frac{20}{32}$	$7\frac{26}{32}$	$18\frac{14}{32}$
5	“ 52 “ goatdung	$40\frac{12}{32}$	18	10	$7\frac{6}{32}$	$17\frac{6}{32}$
6	“ 52 “ humus	$38\frac{6}{32}$	14	$13\frac{6}{32}$	$8\frac{4}{32}$	$21\frac{10}{32}$
7	“ 35 “ human dung	$41\frac{9}{32}$	18	$11\frac{8}{32}$	$7\frac{16}{32}$	$18\frac{24}{32}$
8	“ 35 “ poudrette	$40\frac{14}{32}$	20	$12\frac{8}{32}$	7	$19\frac{8}{32}$
9	“ 4 “ guano	37	12	$12\frac{11}{32}$	9	$21\frac{11}{32}$
10	“ 24 loth=(12 oz. English,) carbonate of ammonia	$36\frac{24}{32}$	11	$13\frac{14}{32}$	$8\frac{4}{32}$	$21\frac{28}{32}$
11	“ 20 loth sulphate of ammonia	40	15	$12\frac{16}{32}$	$7\frac{16}{32}$	20
12	“ 25 loth nitrate of do.	$40\frac{9}{32}$	15	$12\frac{16}{32}$	$7\frac{16}{32}$	$20\frac{10}{32}$
13	“ 24 “ of potash	$37\frac{23}{32}$	13	$11\frac{16}{32}$	8	$19\frac{6}{32}$
14	“ 29 loth carb. “	$51\frac{23}{32}$	30	$10\frac{10}{32}$	$7\frac{6}{32}$	$17\frac{16}{32}$
15	“ 28 “ sulph. “	$45\frac{14}{32}$	29	$13\frac{14}{32}$	7	$20\frac{14}{32}$
16	“ 32 “ nitrt. of lime	$49\frac{12}{32}$	26	10	$8\frac{14}{32}$	$18\frac{14}{32}$
17	“ 30 “ gypsum	$35\frac{21}{32}$	36	12	$7\frac{26}{32}$	$19\frac{26}{32}$
	Average	$41\frac{8}{32}$	19	$11\frac{21}{32}$	$7\frac{22}{32}$	$19\frac{13}{32}$

In the year 1845, the following were the results of a fresh manuring by the same parcels on 100 square feet:

		Product.	Starch.	Residuum.	Dry substance beside.
1	As before,	53 lbs.	$14\frac{12}{32}$ pr. ct.	$6\frac{28}{32}$ pr. ct.	$21\frac{8}{32}$ pr. ct.
2	" "	$70\frac{22}{32}$	$13\frac{24}{32}$	$6\frac{28}{32}$	$20\frac{20}{32}$
3	" "	64	$12\frac{9}{32}$	$6\frac{28}{32}$	$19\frac{3}{32}$
4	" "	$59\frac{10}{32}$	$13\frac{24}{32}$	$6\frac{8}{32}$	20
5	" "	$67\frac{23}{32}$	$12\frac{10}{32}$	$6\frac{21}{32}$	$19\frac{5}{32}$
6	" "	$51\frac{15}{32}$	$13\frac{4}{32}$	$6\frac{28}{32}$	20
7	" "	$59\frac{9}{32}$	15	$8\frac{4}{32}$	$23\frac{4}{32}$
8	" "	$57\frac{3}{32}$	$13\frac{4}{32}$	$6\frac{8}{32}$	$19\frac{12}{32}$
9	" "	$80\frac{2}{32}$	$11\frac{8}{32}$	$6\frac{8}{32}$	$17\frac{16}{32}$
10	" "	66	$14\frac{12}{32}$	$7\frac{16}{32}$	$21\frac{28}{32}$
11	" "	66	$11\frac{8}{32}$	$8\frac{4}{32}$	$19\frac{12}{32}$
12	" "	$78\frac{19}{32}$	$12\frac{16}{32}$	$8\frac{4}{32}$	$20\frac{20}{32}$
13	" "	$76\frac{8}{32}$	$11\frac{28}{32}$	$7\frac{16}{32}$	$19\frac{12}{32}$
14	" "	$66\frac{18}{32}$	10	$7\frac{16}{32}$	$17\frac{16}{32}$
15	" "	57	$13\frac{4}{32}$	$6\frac{28}{32}$	20
16	" "	$59\frac{12}{32}$	$14\frac{12}{32}$	$6\frac{23}{32}$	$21\frac{3}{32}$
17	" "	$49\frac{6}{32}$	$8\frac{24}{32}$	$8\frac{4}{32}$	17
	Average,	$63\frac{20}{32}$	$12\frac{19}{32}$	$7\frac{5}{32}$	$19\frac{27}{32}$

From these results of two years' experiments, the following conclusions may be drawn:

1. The greatest product obtained in the year 1846, was from the parcel manured with the carbonate of potash.

2. In manuring with gypsum the product was not only smaller than without any manure, but it also had 36 per cent. of diseased potatoes, and thus 17 per cent. more than the average of all the kinds of manures.

The unfavorable effect of gypsum may be explained by its attraction of moisture from the atmosphere.

The parcel manured with 30 pounds of gypsum, was still moist after all the others were entirely dry.

The unfavorable influence of gypsum on the potatoes was also evident in the year 1845, as the unmanured parcel yielded a product of 53 lbs., but that manured with gypsum only 49 lbs. The proportion of starch-meal in that manured by gypsum, was only 8 per cent., while the average was 12 per cent.

From these facts it follows, how injurious is the effect of the moist state of the soil on the perfect development of potatoes, and that moisture must be regarded as the principal main cause of the potato disease.

3. The disease was least in the unmanured parcels, and the greatest in those manured with gypsum, nitrate of lime, carbonate and sulphate of potash.

To attempt to drive off the potato disease with various kinds of mineral manure as some endeavor to drive off the brand of wheat, by the use of mineral steeps, such as lime, potash, iron and copper, vitriol, &c. belong to that class of speculations which is not based on any well grounded analogy.

4. The potatoes remaining sound in the year 1846, produced only one per cent. less starch than in 1845, although in reference to the dry substance no difference could be perceived in the sound tubers in these two years.

5. The numbers are entirely different as regards the starch and dry residuum, in the infected tubers.

The actual calculations in this respect give the following results:—

	Starch.	Residuum.	Dry substance generally.	Water.
100 lbs. wholly sound tubers contained	$11\frac{2}{3}$ lbs.	$7\frac{2}{3}$ lbs.	$19\frac{1}{3}$ lbs.	$80\frac{2}{3}$ lbs.
100 " half with brown spots,	$5\frac{1}{6}$ "	5 "	$10\frac{1}{6}$ "	$89\frac{5}{6}$ "
100 " decidedly more infected than the former,	$3\frac{3}{4}$ "	3 "	$6\frac{3}{4}$ "	$93\frac{1}{4}$ "
100 " wholly soft rotten tubers,	$1\frac{3}{4}$ "	3 "	$4\frac{3}{4}$ "	$95\frac{1}{4}$ "*

In those tubers in which the infection consisted simply of wart-like protuberances and star formed fungi, no difference could be perceived in the before mentioned constituents, when they were at the same time examined and compared together.

6. If we compare the product of 1846—without regard to the diseased tubers—with that of 1845, it follows from this comparison that in the whole, the potatoes in 1846 yielded a product one-third less than in 1845.

This decrease of the product shows itself as the mere result of the too dry season in the spring and part of the summer, as well as the continued moisture of the month of August.

Comparative Experiments as to the influence of dividing the Potatoes on the product.—In this instance an aluminous clay soil was selected, the constituents of which were given in the former experiments.

On this soil were drawn rows of 30 inches long and 2 inches wide, manured with perfectly mellow cow dung, and 2 rows planted with 60 whole tubers, 2 with 60 halves, 2 rows with 60 quarters, and 2 rows with 60 eyes with flesh, and 2 rows with 60 eyes without flesh. The result of this trial were as follows:

	Weighing.				Were diseased	
60 whole tubers	6 lb.	gave	$69\frac{6}{32}$ lbs.,	of which	$28\frac{10}{32}$ lbs	or 42 p. c.
60 half "	3 "	"	68 "	"	$24\frac{22}{32}$ "	36 "
60 qr. "	$1\frac{1}{2}$ "	"	$55\frac{20}{32}$ "	"	$29\frac{27}{32}$ "	63 "
60 eyes with flesh	34 loth = 1 lb. Eng.		$50\frac{20}{32}$ "	"	24 "	45 "
60 eyes without flesh	17 loth = $\frac{1}{2}$ lb.		$40\frac{13}{32}$ "	"	$18\frac{13}{32}$ "	40 "

From these experiments, as well as those in 1844 and 1845, which latter are contained in the Transactions of the Imperial Agricultural Society of Steiermark, part 48, it is evident that the dividing the tubers lessens the product.

In the foregoing years also, the proportion of starch was determined in each parcel of potatoes brought in the separate example, and the result was, that the division of the tubers also exerts an injurious influence on the quantity of starch contained; for while the undivided tubers gave 15 per cent. starch, from the product of the mere eyes there was only 11 per cent. starch. The appearance was marked and decisive, that the disease was greatest and almost constant in the division of the tubers into quarters.

2. *Comparative Experiments as to the influence of the wider or closer planting on the product of Potatoes.*—This experiment was tried exactly in the same circumstances as the foregoing, only, there were 2 rows with 60

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*Of every parcel there were 20 lbs. subjected to the examination.

2 rows 120, 2 rows with 240, whole, halves, quarter tubers and eyes, so that the seed tubers in the rows in the first case, were 12″ in the second 6″, in the third 3″ apart from each other. The product or gathering was as follows:

	Weighing.				Were diseased.		
60 whole tubers	6 lbs.	gave	$69\frac{10}{32}$	lbs., of which	$28\frac{10}{32}$	lbs or	42 p. c.
120 "	12 "	"	$69\frac{20}{32}$	"	$30\frac{12}{32}$	"	44 "
240 "	24 "	"	$50\frac{18}{32}$	"	$20\frac{24}{32}$	"	41 "
60 half "	3 "	"	65	"	$24\frac{22}{32}$	"	36 "
120 "	6 "	"	$62\frac{7}{32}$	"	$21\frac{12}{32}$	"	33 "
240 "	12 "	"	$69\frac{26}{32}$	"	$28\frac{2}{32}$	"	37 "
60 qr. "	$1\frac{1}{2}$ "	"	$55\frac{20}{32}$	"	$29\frac{27}{32}$	"	63 "
120 "	3 "	"	56	"	$22\frac{10}{32}$	"	35 "
240 "	6 "	"	$65\frac{21}{32}$	"	$20\frac{20}{32}$	"	27 "
60 eyes with flesh	1.2 loth	"	$50\frac{20}{32}$	"	24	"	45 "
120 "	2.13 "	"	$62\frac{20}{32}$	"	$24\frac{13}{32}$	"	34 "
240 "	7.04 "	"	$60\frac{8}{32}$	"	$21\frac{29}{32}$	"	25 "
60 eyes without flesh	–.28 "	"	$40\frac{13}{32}$	"	$18\frac{18}{32}$	"	40 "
120 "	1.26 "	"	$44\frac{19}{32}$	"	$17\frac{9}{32}$	"	34 "
240 "	3.20 "	"	$42\frac{16}{32}$	"	$16\frac{17}{32}$	"	32 "

Sixty tubers weighing 6 lbs. were divided into eyes with flesh, and gave 318 eyes which planted on an equal space of 120 square feet, yielded a product of $64\frac{4}{32}$ lbs. of which $29\frac{2}{32}$ lbs. or 40 per cent. were diseased.

The conclusions which may be drawn from the above figures are;

1. In equal sized whole tubers the multiplication of the seed tubers bore the proportions, following:

$11\frac{1}{2}$ fold at the distance of 1 foot.
$5\frac{3}{4}$ " " " $\frac{1}{2}$ "
$2\frac{1}{2}$ " " " $\frac{1}{4}$ "

2. Of equal sized half tubers their multiplication was;

$21\frac{2}{3}$ fold at the distance of 1 foot.
$10\frac{1}{2}$ " " " $\frac{1}{2}$ "
$5\frac{3}{4}$ " " " $\frac{1}{4}$ "

3. Of equal sized quarter tubers their multiplication was;

$36\frac{2}{3}$ fold at the distance of 1 foot.
$18\frac{2}{3}$ " " " $\frac{1}{2}$ "
$10\frac{5}{6}$ " " " $\frac{1}{4}$ "

4. Of equal sized seed eyes with flesh, their multiplication was;

$48\frac{14}{17}$ fold at the distance of 1 foot.
$26\frac{2}{19}$ " " " $\frac{1}{2}$ "
$8\frac{24}{57}$ " " " $\frac{1}{4}$ "

5. Of equal sized seed eyes without flesh their multiplication was;

$45\frac{20}{28}$ fold at the distance of 1 foot.
$25\frac{1}{7}$ " " " $\frac{1}{2}$ "
$11\frac{17}{29}$ " " " $\frac{1}{4}$ "

6. The multiplication of the seed tubers is in inverse ratio to the distance at which they were planted or with the weight of the seed used, that is the multiplication of the seed decreases the closer the tubers are laid to each other.

7. At equal distances, for example of 1′, the multiplication in otherwise equal proportions was uniform, and depended solely on the weight only of the tuber laid, and it is almost always less in proportion as the weight of the tubers laid appears to be greater.

If we omit the slight difference, the multiplication of the seed tubers is, proportioned to the distance of 1 inch.

11 fold when the 60 seed tubers weighed 8 lbs
22 " " " " " 3 "
33 " (actually 36 fold) " " 1½ "
24 " (actually 45 fold) " " ¾ "

We see thus that the progress of the multiplication corresponds to the natural arithmetical progression, that is,

The multipication with whole tubers being *a.*
" " the half " " 2 *a.*
" " the quarter " " 3 *a.*
" " the eighth " " 4 *a.*
" " the sixteenth " " 5 *a.* &c.

Their weight being diminished in the same proportion in which they are divided.

By this progress likewise is expressed the proportion of the seed tubers to their product:—

8. The whole tubers yielded the greatest absolute product when they were placed at the distance of 1′. The planting of equal sized whole tubers at the distance of ½′ was attended with the same result, and thus half of the quantity of seed was uselessly expended.

But when the whole tubers were placed at the distance of ¼′, then the plants deviate from this method in their growth, so that the product was diminished almost 30 per cent.

9. If the product of the

Whole tubers be set at		100	then the			
Half "	is	92	or	8	per cent.	less.
Quarter "	"	78	"	22	"	"
Eyes with flesh	"	71	"	29	"	"
Eyes without flesh	"	57	"	43	"	"

10. Allowing forty metzen, or forty cwt. of whole tubers, for a yoke of land, for the production of 400 metzen or 400 cwt.; then the product per yoke is with

Half tubers	368 cwt.
Quarter tubers	312 "
Eyes with flesh	284 "
Eyes without flesh	228 "

Subtracting the quantity of seed from the product, then there is produced per yoke,

360 hundred-weight with whole tubers.
348 " " half "
302 " " quarter "
279 " " eyes with flesh.
225 " " " without flesh.

The difference in the products appears yet more striking, when the quantity of starch-meal contained in the potatoes is also taken into the account.

Experiments taught that the proportion of starch-meal contained in the potatoes, which were gathered from the whole ones, is far greater than from the divided tubers. If we call the first twelve and the last ten per cent.,* the product in starch per yoke, is

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* According to the experiments which were tried at the farm, the proportion of starch was fifteen per cent. in the first, and only eleven per cent. in the second.

At 48 hundred-weight with whole seed tubers.
" 36.8 " " half " "
" 31.2 " " fourths " "
" 28.4 " " eyes with flesh.
" 22.8 " " " without flesh.

From these experiments as well as those in former years, it plainly follows, that the planting of whole knobs, should possess a decided preference to the divided ones, and that only partially conducted experiments can lead to an opposite result.

3. *Comparative experiments respecting the influence of the size of the potato tubers used as seed on the product.*—This experiment was tried under entirely similar circumstances with the foregoing, only there were here two rows laid with sixty whole tubers, which had the following weight and yielded the product subjoined.

		Weighing.					Were diseased.	
60 whole tubers	$16\frac{1}{2}$ lbs.	gave	$50\frac{27}{32}$ lbs.,	of which	$31\frac{1}{32}$ lbs.	or	56	per cent.
" "	10	"	$52\frac{28}{32}$	"	$27\frac{5}{32}$	"	46	"
" "	3	"	$48\frac{23}{32}$	"	$13\frac{30}{32}$	"	27	"
" "	$1\frac{1}{2}$	"	$43\frac{24}{32}$	"	$17\frac{13}{32}$	"	37	"
" "	$\frac{3}{4}$	"	$32\frac{15}{32}$	"	$12\frac{15}{32}$	"	33	"

From these numbers we draw the following conclusions:

1. That seed potatoes in which the weight exceeds one-sixth of a pound, or five loth (equal to two and a half ounces English) are unfavorable for the product.

2. That the rot reaches its maximum in the largest potatoes, while the disease in the seed tubers of one-twentieth of a pound, or one and three-eighths of a loth, (not quite three-quarters of an ounce English,) a piece fell off only twenty-seven per cent.; and,

3. That potatoes of this size not only appear to be most suitable for seed in reference to quality, but also in respect to quantity.

These are the results of the experiments which the members of the tenth convention of German husbandmen and foresters have witnessed at the experimental farm of the Royal Agricultural Society of Steiermark.

APPENDIX No. 6

MISCELLANEOUS.

The Theory of Haymaking.—When grass first springs above the surface of the earth the principal constituent of its early blades is water, the amount of solid matter being comparatively trifling; as it rises higher into day the deposition of a more indurated form of carbon gradually becomes more considerable; the sugar and soluble matter at first increasing, then gradually diminishing, to give way to the deposition of woody substance.

The following table affords a view of the composition of rye grass before and after ripening:

	18th June.	23d June.	13th July.
Water,	76.19	81.23	69.00
Solid Matter	23.81	18.77	31.00

These are important practical facts for the agriculturist; for if, as we have endeavored to show, the sugar be an important element of the food of animals, then it should be an object with the farmer to cut grass for the purpose of haymaking at that period when the largest amount of matter soluble in water is contained in it. This is assuredly at an earlier period of its growth than when it has shot into seed, for it is then that woody matter predominates; a substance totally insoluble in water, and therefore less calculated to serve as food to animals, than substances capable of assuming a soluble condition. This is the first point for consideration in the production of hay, since it ought to be the object of the farmer to preserve the hay for winter use in the condition most resembling the grass in its highest state of perfection. The second consideration in haymaking is to dry the grass under such circumstances as to retain the soluble portions in perfect integrity. To ascertain whether hay by the process and exposure which it undergoes loses any of its soluble constituents the following experiments were made:

1st. 3,000 grains of rye grass in seed on the 13th of July, gave up to hot water a thick syrup fluid, which when dried till it ceased to lose weight 212°, weighed 217.94 grains, equivalent to 7.26 per cent.

2d. 2,500 grains of rye grass digested in cold water, yielded 53.23 grains of extract, equal to 2.12 per cent. This rye grass contained 31 per cent. of solid matter, and 69 per cent. of water.

3d. New hay made from rye grass, and containing 20 per cent. of water for the sake of comparison, was also subjected to similar trials.

1st.	Grains.		Grains.				
	1369	gave to hot water,	220.77	of extract	=	16.12	per cent.
	1000	" "	159.34	"	=	15.93	"
	1000	" "	140	"	=	14	"

2d. 2,000 grains of new hay in seed, digested in cold water, yielded 101.3 grains of extract = 5.06 per cent. of soluble matter.

From these numbers we learn that 100 parts of hay are equivalent to 387½ of grass. This amount of grass should contain of soluble matter in hot water 28.13 parts, and in cold water 8.21 parts. But the equivalent quantity of hay or 100 parts only contain 16 instead of 28 parts soluble in hot water, and 5 06 instead of 8¼ parts soluble in cold water. A very large proportion of the soluble matter of the grass has obviously disappeared in the conversion of grass into hay. The result of the hay making in this particular instance has, therefore, been to approximate the soft, juicy and tender grass to woody matter, by washing out or decomposing its sugar and other soluble constituents. These facts enable us to explain the reason why cattle consume a larger amount of hay than is equivalent to the relative quantity of grass. Thus, animals which can subsist upon 100 pounds of grass, should be able to retain the same condition by the use of 25 pounds of hay, if the latter suffered no deterioration in drying. The present series of experiments however, show that a cow thriving on 100 or 120 pounds of grass, required 25 pounds of hay, and 9 pound of barley or malt, affording thus, collateral evidence of the view which we have taken of the imperfection of the process of hay making at present in use in this country. The great cause of the deterioration of hay is the water which may be present, either from the incomplete removal of the natural amount of water in the grass by drying, or by the absorption of this fluid from the atmosphere. Water when existing in hay from either of these sources, will induce fermentation, a process by which one of the most important constituents of the grass, viz: sugar, will be destroyed. The action necessary for decomposing the sugar is induced by the presence of the albuminous matter of the grass; the elements of the sugar are made to react on each other in the moist state in which they exist, in consequence of the presence of the water and oil, and are converted into alcohol and carbonic acid, according to the following formula:

	Carb.	Hyd.	Oxyg.
1. Atom sugar	12	12	12
2. Atoms alcohol	8	12	4
3. Atoms carb. acid	4	0	8

That alcohol is produced in a heated hay-stack in many cases, may be detected by the similarity of the odor disengaged to that perceptible in a brewery. We use this comparison because it has been more than once suggested to us by agriculturists. The quantity of water or volatile matter capable of being removed from hay at the temperature of boiling water, varies considerably. The amount of variation during the present experiments was from twenty to fourteen per cent. If the lower per centage could be attained at once, by simple drying in the sun, the process of hay making would probably admit of but little improvement; but the best new made hay that we have examined contained more than this amount of water; the numbers obtained verging towards twenty per cent. When it contains as much as this it is very liable to ferment, especially if it should happen to be moistened by any accidental approach of water. The only method which we have found to succeed in preserving grass perfectly entire, is by drying it by means of artificial heat. Rye grass contains, at an early period of its growth, as much as eighty-one per cent. of water, the whole of which may be removed by subjecting the grass to a temperature considerably under that of boiling water; but even with a heat of 120° the greater portion of the water is removed, and the grass still retains its green color, a character which appears greatly to add to the relish with which cattle consume this kind of provender. When this dried grass, (as it may be truly termed by way of distinction from hay,) is examined, it will be found to consist of a series of tubes, which, if placed in water, will be filled with the fluid, and assume in some measure the aspect of its original condition. In this form cattle will eat it with relish, and prefer it to hay, which in comparison is blanched, dry and sapless. The advantages obtained by this method of making hay, or rather of preserving grass in a dry state are sufficiently obvious. By this means all the constituents of the grass are retained in a state of integrity; the sugar, by the absence of water, is protected from undergoing decomposition; the coloring matter of the grass is comparatively little affected, while the soluble salts are not exposed to the risk of being washed out by the rains, as in the common process of hay making. The amount of soluble matter capable of being taken up by cold water, is according to the preceding trials, as much as five per cent., or a third of the whole soluble matter in hay. We may, therefore, form some notion of the injury liable to be produced by every shower of rain which drenches the fields during hay harvest. It is not only, however, the loss which it sustains in regard to the sugar and soluble salts, that renders hay so much less acceptable than grass to the appetite of cattle. The bleaching which it undergoes in the sun, deprives it of the only peculiarity which distinguishes the one form of fodder from the other; grass deprived of its green coloring matter presents exactly the appearance of straw, so that hay ought to be termed grass straw. It is obvious, from the experiments detailed, that the operation of hay making, as conducted in this country, has a tendency to remove a great proportion of the wax in the grass. Thus it was found that rye-grass contained 2.01 per cent. of wax. Now, as 387½ parts of rye-grass are equivalent to 100 parts of hay, and as 387½ parts of grass contain 7.78 parts of wax, it is obvious that 100 parts of hay should contain the same amount of wax; but by experiment it was found that two hundred grains of hay contained four grains of wax, which is equivalent to two per cent., almost exactly the amount contained in grass. Hence it appears that no less than 5.78 grains of wax have disappeared during the hay making process. The whitening process which the grass undergoes in drying, renders it apparent that the green coloring matter has undergone change; but that it should have been actually removed to such an extent, or at least have become insoluble in ether, is a result which could scarcely have been anticipated without actual experiment.—*Dr. Thomson on Food.*

APPENDIX No. 7.

ON BEAR GRASS.

Navy Department, Bureau of Construction,
Equipt. and Reps., 31st January, 1848.

Sir:—I transmit herewith a report from Boston Navy Yard, in relation to the "bear grass" forwarded to the superintendent of the U. S. ropewalk at that establishment, from which it appears, the article is unfit to be manufactured into cordage. Repectfully, Your obt serv't.

CHAS. WM. SKINNER.

Hon. E. Burke, Com. of Patents.

U. S. Ropewalk, January 29, 1848.

Sir:—In obedience to your order of the 27th instant, I have examined and spun into yarns a specimen of bear grass submitted to you from the bureau of construction, equipment and repair. I have made a test of its strength in comparison with manilla, which it resembles more than any kind of hemp, and the table appended, which I have the honor to offer for your consideration, shows the result.

It will be seen that this grass possesses less than one-third the strength of manilla, the dirt and tow being $41\frac{50}{100}$ per cent. while the manilla gives but $1\frac{88}{100}$ per cent.; therefore in my opinion the bear grass is decidedly unfit for making cordage for vessels.

BEAR GRASS.								MANILLA.							
Weight of hemp.	Tow extracted.	Hemp dressed.	Per ct. of tow and dirt.	Strength of yarns respectively.	Strength of yarns respectively.	Av'ge of strength.	Size of yarns.	Weight of manilla.	Tow and dirt extracted.	Manilla dressed.	Per ct. of tow and dirt.	Strength of yarns respectively.	Strength of yarns respectively.	Av'ge of strength.	Size of yarns.
lbs.	lbs.	lbs.	Per ct.	lbs.	lbs.	lbs.		lbs.	lbs.	lbs.	pr ct	lbs.	lbs.	lbs.	
				88	50			$1\frac{6}{100}$	$\frac{2}{100}$	$1\frac{4}{100}$	$1\frac{88}{100}$	213	265		
$1\frac{6}{100}$	$\frac{44}{100}$	$\frac{65}{100}$	$41\frac{50}{100}$	95	80							270	215		
				70	80							261	237		
				80	71							205	265		
				55	85							245	210		
				388	366	$75\frac{4}{10}$	20^{8}					1194	1192	$238\frac{8}{100}$	20^{3}

With the highest respect, sir,
Your obedient servant,
WM. CABAN, *Superintendent*

Commodore F. A. Parker,
Commanding Naval Station, Boston.

APPENDIX No. 8.

ON FLAX CULTURE.

Guide to the culture of flax according to the Belgian Westphalian mode, by which the scholars of the Aderbach spinning school are taught. Translated from the German of Lewis Charles Edler von Nadherny, by E. Goodrich Smith of the Patent Office.

Soil and climate.—The soil in general most suitable for flax is a mild loam soil because it allows a rapid development of the tender germ of the plant, and great dryness is not so injurious to the same, as for example, is a heavy binding clay soil, a light loamy soil too may be well harrowed, rolled and generally worked over; therefore it can be taken as the standard, that a very good grain soil (barley-soil) appears to be almost always the best adapted to flax culture. But particularly in the choice of the soil regard should be had that neither the mould be too strong nor the subsoil be too loose; because the root of the flax, in a deep grounded and loose soil, penetrates to the depth of one to one and a half feet. As respects the climate, flax succeeds only remarkably, where a copious and rich formation of dew finds place, and when the atmosphere generally is more moist and cool than dry and warm. As a proof of this we refer to Tyrol, Steiermark, Silesia, Belgium, &c.

Manuring.—As regards the manuring of the soil, we must decide whether it be desired to raise fine flax not so fine or but in large quantity.

In the first case it is very well to manure the previous crop quite strongly, and in the spring, before the seeding, carry on the drainings of the dunghill, or if this cannot be procured, the flax when it is some inches high may be strewed over with lime, gypsum, peat ashes, &c.

But it must here be observed that flax will not agree with horse or sheep dung, and so only the dung of horned cattle is to be used. The most admirable manure for flax is the drainings of the dunghill, as experience has taught that flax succeeds not so well after any other kind of manure.

If a person wishes, on the other hand, to produce not fine flax so much as a large quantity, then the ploughed field must be manured in the spring, eight to ten weeks before the seeding.

Previous crop.—The views and opinions are divided on this subject. But experienced writers in this say, that in dry fields the best previous crop for flax is potatoes or grain, and in a moist one, oats is suitable, and that at least ten years should pass before flax be cultivated on the same field.

Preparation of the soil.—In regard to this no universal rule can be given, and every husbandman must be guided by the condition of his field, but two main points may be laid down and kept in view, viz:—

1. The better the field is worked over, all the large clods broke to pieces and the soil made like that of a garden, the better will flax succeed.

2. We should always plough as deep as the soil will allow; if, therefore we can plough one, to one and a half feet deep, we should do so. The procedure in the preparation of the field according to rule is as follows:—

The ground must usually be ploughed three times, viz., in the autumn, shallow, in the spring, very deep, and finally for the seeding, very shallow. The autumn furrows are left to lie rough over the winter, but in the spring it is well harrowed, as also the deep spring furrows must be harrowed before the third ploughing.

After harrowing, and before the third ploughing, the drainings or liquid manure must be carried on; in one or two days the field must be again well harrowed, and left to lie some time; then follows the third ploughing, after which the field is again well harrowed, until no clods are to be seen. Then we must leave the field, and after some days seed it down, as the sowing flax seed in a fresh ploughed furrow never answers well. This is the procedure when the field is not manured in the spring; but if this be the case, then the manure must be carried out in winter, and when the weather allows, be strewed and ploughed. The further procedure then remains the same as already given.

When flax is sown, the field must be rolled firm with a heavy wooden or stone roller like a hogshead. The beds must be laid out very broad and very shallow; between the beds the furrows must be somewhat trimmed by a laborer with a shovel, in order that the people may enter and weed.

Choice of seed.—The properties of a good seed are—

1. It must be clear, brown and have a shining color.
2. The kernels must be thick and full, and
3. They must soon sink into the water, to the bottom; in the fire, or cast on the coals, burn with a strong crackling, and laid in a pan which is held over the fire it must spring out, from the heat.

Strength of the seeding.—In regard to the strength of the seed, there can no directions be given, only it is to be noticed that they who wish to raise a fine flax, must put in a strong seeding.

But whoever has no wish to seed for a fine crop, need not sow so thick; he who raises flax for its seed must sow thin, in order that the plants may properly spread, and the stalk be coarser and more solid.

The quantity of seed per yoke, (equal to nearly one and a half acre,) two-thirds of a metzen for raising seed, (a metzen is equal to nearly sixteen quarts;) three-fourths of a metzen for a coarse flax; four-fifths of a metzen for fine flax.

Time of sowing.—With respect to the time of seeding it is profitable to sow flax in season, in order that the winter moisture may be useful, and the ground flea (erd floh) may not injure it; but on the contrary in an early sowing the cold winds of spring are to be feared, which are very injurious to the tender flax plants, and therefore, no general rule can be established, but we must guide ourselves by the circumstances of the climate, and thereby have in view that the flax does not require for its period more than from twelve to thirteen weeks.

Culture.—As soon as the flax has reached to the height of one or two inches, it must be strewed over with ashes, which is regarded as a very good means against the ground-flea, and also garlic must be cut fine and mixed among the seed, which is likewise a good means against this insect. When the flax has reached the height of from five to six inches it must be weeded, and in this every possible injury must be avoided.

When the object is to obtain very fine flax, the flax field must be lathed, i. e., laid with flat birch rods, which lie upon lathes and between which the flax grows, and is protected from laying.

Harvest and the pulling.—The time of harvest must be decided by the question, whether we aim at more perfect or less fine flax. In the first case we may assume eight days after the complete blossoming as the period for pulling; in the second case we may wait before we pull it until most of the stalks are yellow in their whole height, and the seed have in the greatest part become brown. But to wait for the inner bark to do so, is injurious; for were we to allow the flax to remain till the ripening of the seed, we should lose too much, while the fibres of the generally ripened flax are not only coarse, but they are so scanty that they are entirely destroyed.

Assorting.—If we wish to rot it green in water, it must also be assorted at the time of pulling, i. e., the strong put with the strong, the weak and fine with the fine, the red and black stem with such as are of the same color. But if the flax is to be first submitted to the drying, then it must be assorted according to the before named Coutrai system, and afterwards the assorted portions are to be taken into the barn.

LUDWIG CARL EDLER V. NADHERNY.

Schloss Adersbach, *March*, 1847.

APPENDIX No. 9.

METHOD OF CULTIVATION AND CURE OF CUBA TOBACCO,

As practised in Cuba and the other West India Islands.

Translated from the Original Spanish Work by Julian Silveyra, Havana, 1845.

Translator's Preface.—Having by the kindness of a friend, been enabled to obtain a copy of a very valuable work on the "*Cultivation and Cure of Cuba Tobacco,*" and knowing that the work was prohibited from being sent from the island, and learning that there was no other copy among us, I was induced, by the advice of a friend, a distinguished tobacco factor in New Orleans, to lay it before the public, in the hope that it might be the means of being of some benefit to the agricultural portion of our community, and that if the suggestions which are made, are valuable, that they might be followed. If so, I shall be repaid for my trouble in preparing these pages. There are in reality some new ideas in respect to the application of manure which may be of utility to the planter. The cultivation of Havana tobacco for cigars, is a branch of agriculture which has received the attention of planters of the south for several years past. The continued low price of our principal staple has caused many to look around to find some other object upon which to spend their labor so as to reap an adequate return. Humbugs have had their day, and the "*morus multicaulis*" is "numbered among the things that were." Speculation has followed speculation—each one has failed—and now the truth has forced itself upon the planter, that to save himself he must cultivate that which yields the greatest profit. There is now offered to the cultivator a substitute for cotton, which, if followed, cannot fail to average much more than any thing else. The tobacco planters in the West Indies have long held a monopoly in their own hands, and we have been compelled to pay them a heavy tribute for the pleasure of smoking a good cigar.

There is no doubt, I imagine, that blessed by Providence with such a soil and climate as ours, we should be able to raise as good tobacco in Louisiana, and some of our other southern states, as they do in Cuba, and if the flavor is not so aromatic, and the color so rich, it will at least be a very good substitute.

The new ideas originating with Sr. Don Silveyra may prove instructive and practically good. Several gentlemen of my acquaintance have, for two or three years past, cultivated tobacco, and expressed themselves generally pleased with the result. There are several peculiarities in the style of the Spanish work and things, which will, doubtless, meet the disapproval of some.

I confess that the views of the Spanish author do not *all* suit me, but as I determined in the outset, I will not commence a criticism, but give a free translation. Try this plan, and if it is good, "hold on to it," if not, cast it away. I am convinced that his plan for sowing and planting his seedlings is good, but the time he mentions will not suit our climate—for when he is about to commence planting, our crop is nearly ripe. Again—all this mystery of preparing his field, I cannot understand, nor why he sows and plants so late. His plans of cutting, distances, &c., will meet many opposers. I could mention many other particulars which will appear strange to some, but will present the book as it is translated.

With many apologies for thus intruding myself upon the public, but offering as my excuse my regard for the southern planting interest.

I remain, most respectfully, your obedient servant,

JAMES S. PEACOCKE.

East Felicianna, August 25th, 1846.

On the Cultivation and Cure of Havana Tobacco.

In the beginning of May, the labors of the tobacco grower commences, at which period I prepare the land destined to be the field, ploughing and harrowing it three or four times in all during the month; by this operation I have destroyed the sprouts of the seeds which spring up with the first rains. I then divide said land into parallelograms from north to south, fifty yards in breadth and two hundred in length, divided by spaces of four yards, sufficiently wide to allow a cart to pass, and in which I go depositing the pure manure of the horse, of which preparation I shall speak hereafter. In the middle of June, (the land being regulated to this order,) I furrow across the breadth of the parallelogram from east to west, at five-fourths of a yard distant. I pass the plough through the furrow three or four times in order to widen and deepen it much as possible, to be able to facilitate the operation of finishing the furrow for the hand of man, making a ridge that I collect to the south side of the said ditch which shall be made in the said field. This operation being concluded and all the manure gathered into the spaces which foresight and diligence could collect, already the beneficent rains have soaked many times these ditches. I should follow after that, placing the manure in them, distributing by rule the quantity without exceeding a fourth part of its depth, which excess would injure the powerful tone of the plant. I should add to the said manure two-thirds of the decayed earth, and should stir them together until they are perfectly mingled, then leave them until they had received two or three rains, concluding the operation by covering with the rest of the dirt, or earth, forming a ridge or dyke, whose declivities turn within the ditch, and through them the water passes to the interior or bottom, when it will effect the ultimate fermentation of the manure combined with the earth which impede the rapid marth that ought to be made in a field so precarious and delicate.

At the middle of June should be concluded the operation of opening the ditches, and, in the five subsequent days the distribution of the horse manure, mixed with two-thirds earth, in which state it should be left until the end of the month, to give it time to soak in the rains that fall upon it; after that, cover it in the manner referred to. The middle of July will be time to commence the formation of land destined for seed plots which will be as extensive as the means of the proprietor will permit. The ground being well prepared, and kept entirely free from those insects which are accustomed to infect it, will produce great gains, bringing fort*h* abundant and choice plants of which to make the field, and a secure sale of the residue, which will always find purchasers

The operation of making seed plots is exceedingly simple; without delay seek a particular method, that when treated will produce a good result. It suits not that the land be very rich, because the plant would be too precocious, and happening to suffer mistakes at the time of arranging them for transplanting, placing them very tender, in the belief of their being well advanced, for their great size would infallibly cause them to die, or if not, to degenerate or form a bad plant. It is better that the land should be somewhat broken, but if that could not be obtained, I would form high levels, avoiding always the low, since they are notoriously prejudicial. The plots should be formed two rods in width, and eight in length, divided by paths a yard wide for passing and re-passing. I would point holes in the patch or plot not very deep, with a pick axe or mattock, leaving the paths untouched of their natural hardness; but if very sandy and light, press them down hard to impede, without delay, the intruders which unfortunately invade sometimes the plot. I would endeavor to break the surface as little as possible, and enrich it a little, lightly with powdered dirt well sifted, which should be mingled perfectly with the plot, freeing it from all sweepings of the litter that might occupy the ground and produce insects in it, for the causes that I will explain might appear in these places. For this account it is prejudicial to form the plots with boards of palms or other things. In the beginning of August, two or three patches should be sown, with a light handful of seeds, perfectly free from dust and straw, by which the experienced workman will be able to judge of the quantity sown, endeavoring to have it sparsely sown to the end, that springing clear it may increase with freedom, free from those inconveniences which would result from two close contiguity, putrefaction arising from it being the worst that can appear. And when in this multitude there succeeds any breaking or crushing, it is the cause of engendering insects without number, whose authors are decomposition and the odor arising from plants crushed and dying. If it happens that in sowing the seed, any should fall out of the buds and spring up, I would gather them and throw them beyond the precincts, to prevent those passing in the paths from treading upon them, producing those injuries above referred to. Every three days I should repeat this operation with the above mentioned patches, even to the conclusion of the seed patch: recommending always the greatest care in saving, the lack of plants being preferable to exposing all to inevitable destruction, when thickness produces putrefaction, which is easily occasioned by want of air to the tender stems, and the indispensable moisture which the young leaves suffer in the pressure they find, which disengages the balsamic odor of the plant, attracting from a distance butterflies and other insects that destroy. If there happens a failure of water in those days, I would water the patches every moderate morning with a very fine sprinkling, without opening the hand, that a surge of water might be avoided, which would be noxious to the springing plant. I repeat it once and a thousand times, that nothing is so prejudicial to tobacco as the putrefaction of its own leaves, badly treated from whatever cause, and recommending so much care from the beginning, that the existence of its many enemies may be avoided. And I would carefully pull these leaves from the growing, obtaining the benefit to the plantation, that the healthful leaves are preserved while the above mentioned injuries are kept away. The plants should be irrigated early in the morning as possible, in order to imitate beneficent nature in this respect, which does it all in the night in the midst of serenity, keeping the ground moist most of the time after the going down of the sun. It is extremely prejudicial to irrigate in the afternoon, on account of their having been heated by the excessive warmth of the sun, and the irrigation producing immediately a violent evaporation, causing a true boiling in the plants, nearly kills them, or if not they grow in extreme debility and never produce good plants for the field, sacrificing by this bad practice the tender victims of so many labors, and from which was expected a source of fruitfulness. After the seeds of the tobacco spring up, the foreign herbs should be weeded out, those which existed in the land as well as those which were in the manure placed on the plots; not however interfering with them unless they occupy the place of the tobacco, impoverishing the land of the fertility which ought to be employed upon the plant for which it was destined, and in this case remove them with much delicacy and gentleness, in order that the plants be not injured in avoiding more fatal consequences; neither should any of the herbs be left on the beds or paths of the plot, because their stay in any part of the precinct would be prejudicial. Equally noxious is the practice of covering the seed plots to preserve them from the sun, whose beneficent heat dilates the impulse, which impels the sap to the tender leaf, giving strength to its fibres, and the elasticity which hastens its development, the scales falling which held them, the patches unfurling, expanding and shooting to the light, acquiring force, the organs strengthen themselves as the bond is broken, it begins to increase and take the true color. Its elastic stalk, solid and moveable at the same time, subministers a part of the nutrition, glue is in the ascending sap, and sporting, moving itself in the air, attracts from the atmosphere all the principles which form the descending sap, beautifying and nourishing the plant which sustains it. When the seed plot has arrived at a condition for transplanting, I would open for the first time the field, and with pick axes, very sharp, would free the ground perfectly from all herbs, clearing and removing all litter that the paths might have no filth by which to engender an infinite variety of insects which would be enemies to the new host, that is exclusively to inhabit this *mansion*. I would open with pick axes the furrows which are necessary to make the first field, leaving closed the rest until the time for using them. I would take two-thirds dirt, mingled with manure, placing it to the north of said furrow, for use when needed. I would equalize the spot, removing it slightly, in order to separate it and make soluble the dirt which is going to receive the planting. In case of much drought, I would sprinkle these furrows that the young plant might encounter sufficient moisture, and not experience this operation after transplanting, which would need it more abundant on this occasion; yet a superabundance would be injurious. It is easy to know the importance of this operation; that removing from the plant the soil that sustains it, opening the source of vegetation which receives the new plant, it can but be compelled to give all its vigor and fertility to the host, which should receive all its benefits. The tobacco plant is a nice observer of whatever can administer to it from the soil or atmosphere, as much for the facility that the oblong configuration of the leaves gives, whose extraordinary size is evidently to collect the constituent parts from the air, which forms the descending sap that goes to nourish it, as for the manner in which its roots elaborate the nutritive parts of the soluble sap, and the nourishing elements contained in the preparation of the land, since it is well known by experience that the leaves suck and elaborate the moisture, and also that they decompose the atmospheric, appropriating to themselves the fixed air, carbonic acid gas, or the essential principle of vegetation, absorbing the useful part and throwing off the useless.

The season for transplanting is when the young plant has budded four or six leaves, and contains three or four joints in the stem. It has also acquired an elasticity which resists the action of breaking that happens to those which are tender. They should then be brought into the place designed, and the shoot turned towards the earth, after which taking hold its buds, very lightly for protection, by which I would save without danger the root that can penetrate only a little on account of the shoalness of the patch I have recommended, I would proceed collecting them with uniformity in the left arm, in the form of a bundle, which I would deposit in baskets kept for the purpose. I would do this early in the morning, suspending it when there is no dew, because moving them without dew would produce friction among the young leaves, thereby the epidermis of the beautiful plant becoming broken, exhaling balsamic odor and occasioning putrefaction, as much in those transplanted as those left, which attracts thousands of butterflies and other insects, which exterminate the seed plot. The dew prevents or repairs the chafing and keeps them fresh the rest of the day, enabling them to be sown in vigor. They should be left in a place where the air circulates, carefully covering the root that they may not lose their juices by the delay, or laying in the sun. If there are many plants, it would be convenient to scatter them along in the furrow, guarding the distances so that the planter can easily reach them. The distribution concluded, they should proceed with the operation of transplanting, at the medium distance of half a yard, (the Spanish yard differs a little from the American,) with which in the left hand I would designate the place where the plant should be placed, keeping always from the line which forms the guard spaces of the parallelogram, with the greatest uniformity. The planter should take the plant in the left hand, bracing all the leaves in the same direction, with which should be supported the roots and trunk: and with the right hand fingers joined like a shovel, I would excavate an oblique hole in the southern limit of the hill or furrow in which I would place the plant, and with both hands press the soil upon the roots, in order that they may adhere to it, endeavoring to let the top of the plant recline to the wall (hill) which will serve a temporary protection against the rays of the sun, and protect it from the wind in its tender state. If the ground has been soaked by rains, I would not press the soil down upon the roots at the time of transplanting, because it would cause a great torpor in their growth, preventing them from extracting the juices necessary to their increase, or it might be the ascending sap, through which avenues it communicates with the plant: moreover, the said inappropriate pressure occasions a true strangulation, which impedes the circulation of this vital principle, which leads to debility and death. In such a case, the roots should be only lightly covered, avoiding always any vacuum between them and the soil, because in it putrefaction would be elaborated, occasioned by the want of communication in this hardness that the ground had acquired by being used in this state, forming a barrier continued and impenetrable. I would suspend the planting, in such cases, until the following morning, when the ground should be drained. I would commence the transplanting immediately after the plots begin to produce good plants, which will be from the middle of September at farthest, without attending to the pernicious customs springing from apathy and indolence. There are many proverbs among such labor, as "The season decides the time for sowing"—"When it begins to rain begin the year," and many other errors, which serve as pretexts to let the precious time pass away, and make not the least diligence to obtain the good that is to be. The best season is the epoch of the year, which nature defines for operations, and "heavy rains," "ebb tide," fabulous declines and other stories should not be obstacles to impede the rapid march that should attend so luxuriant a cultivation. In truth, when the young plant is ready, wait not for "shower," or "ebb tide," as the least delay in transplanting would occasion great loss. The system of improved or enriched furrows frees from inconveniences, being able to advance from the time the plant is ready, because in the bottom is found sufficient moisture preserved by the furrow or dyke placed there, with this intent, sufficient time before; with which abundance, the transplanting can be moistened if the drought should continue; which operation, I repeat, is necessary to be done early in the morning, for reasons above demonstrated. When the transplantings have been concluded, the plants commenced vegetating, and the first leaves appeared, is the time to brush or throw over the first dirt, which operation is commonly called covering. If the drought continues, I would soak four or six ditches of the first field, and continuing to cover with dirt, which in the first operation was light, making it an object to aid the plant by placing it in a good direction. Every day this covering should be repeated in the same manner until done.

In a few days the change effected in these plants will be visibly seen, the prodigious growth they have made by the virtue of the manuring they have received, expanding more and more, from the fund of fertility in which they have been situated. This extraordinary vegetation astonishes the producer, and leaves him not a moment to rest, compelling him to dedicate himself to the assistance and education of his tender and growing plantation. After they have put out four or six leaves, I would give the second and last dirt to the covering which would be with all that had found existence out of the furrow, or upon the part of the north, caring as much in this as in the first working, to not injure the trunk, stem or leaves, lest some of them should be injured, and afterwards result the injury of putrefaction and its contingent effects. Afterwards I would level and smooth the ground under the plants, leaving no hard clod or other object, against which the first lower leaves, waving in the wind, could injure themselves. I would sweep the *pathways* with a broom, to free them of the nests of insects, which may be destroyed with more facility. In this condition it would declare war with the laborious experimenter, who with strong motive should consecrate himself to fight with a vigorous army, that marches with a gigantic step to the end of its career. What prodigious transformations are experienced in the plant, day by day!! How incessant the increase! how steady the growth! A growth so precocious cannot be exaggerated, since, like to the head of the hydra, every day despoiled, the same plant, to-day trimmed and pruned, appears the next day with the same phenomena. The broad pathways scarcely permit the step, and many times one must walk upon the side, to not break with his body the luxuriant leaves, not being able to pass a line without his head entering into one or the other, so impenetrable is the green and solid wall he himself has planted. The whole plantation forms the most enchanting plain, displaying the most pleasing illusions, and seen from a distance seems a sea, whose waves are gently undulating. Whoever has seen the fertile vales of the river Saint James in the section of Saint Monica, would form a true idea of the beauty and richness of this privileged culture, which could not fail to stimulate men the most listless and inactive.

I recommend very particularly the clearing of the streets or paths and furrows, to prevent decomposition, and protect them from worms, bugs, crickets, and other vile insects, terrible enemies of tobacco, which, having no dens, it will be easy to destroy. In the same manner I would not permit to remain upon the plants, suckers, leaves, or other vegetation which incessantly springs from or around the stem, because they deprive the true leaves of those juices which give them size and quality. I would take the weeding and trash entirely out of the field, because the decomposition would occasion putrefaction, more injurious from the strong odor of balsam in solution that attracts many butterflies from the environs, and the consequences resulting from their multiplicity.

The tobacco having been cropped or topped at the height it should stop, the flower having appeared, three or four handfuls of dirt should be given it, and the ripening of the leaves will begin, which state will be known by their perfect formation, the pumice and crystallization of the sap, which appears in globules, sandy globules, colored different shades of yellow, according to the state of the atmosphere, the size of the spot varying to the action of heat or cold, and if one wishes to increase the color of the leaf, it should be left a longer time, until fully ripe, which will produce more quality in virtue of the fermentation the sap makes in the parenchyma or cellular texture, in which state it should be cut, since in this state it is exposed to many injuries, besides becoming spotted. Excessive dew or showers that cannot be absorbed by the leaves, brings on torpidity, which occasions fermentation and debility of the epidermis or cuticle. The sun shines upon them, and spots of iron &c. &c., are formed upon them, which truly mar their beauty The first leaves, being nearest the ground, ripen first, and are subjected regularly to these defects. Moreover, for their little quality, which results from want of air, continual friction, moisture and other causes, which makes them inferior and renders them unfit for any use except fillings, &c. The best manner to cut tobacco for convenient experiments, is, in hands of two or three leaves hanging from a part of the principal stalk of the plant, cutting from top to bottom with a very sharp curved knife, and near as possible the stem of the leaf, caring to not wound it, because from this avenue it would lose the necessary juices—in this state it will perfect its quality, which is done by elaborating by the fermentation of its materials. The knife made in the form of a sickle, should be taken in the left hand, and with the right hand grasping the lower part of a bunch, raising it gently to discover the stalk to see where to cut; afterwards I would place said bunch or cluster in the middle of the path, the superior part of the plant underneath—the lower part exposed to the sun for it to be withered, and that it may be collected with facility and placed in the cujis or sticks where scarcely half of the bundles would have been contained if this operation had not been done. I would endeavor to not leave much of the stalk in the bundles, for the difficulty occasioned to the leaf in drying, since the leaf, although weak, continues receiving the ascending sap, which juice greatly impedes this most interesting operation, which ought to be rapid as possible to avoid the terrible effects of fermentation, putrid fermentation which is commonly called "excoriation," communicating itself with rapidity to the whole deposit, and assumes the appearance of a pestilence, producing great loss.

Tilt galleys should be formed around tobacco houses, in which to deposit the sticks that have been cut by sections, to the end that the gathering may be performed in good order, not until after they have made the first fermentation, which the workman call ripening, and which will hasten very much the drying of the leaves in the said houses.

The empty cujis should be placed upon some wheels in the guard spaces, wheels two yards wide, and which will be able to contain eight loaded cujis, which the gatherer will fill with those first cut, since they are most withered and should not be left too long in the sun. The mode of collecting said bundles is sufficiently well known, and it is truly very advantageous to parade the bundles apart, being careful that the wind shall not make them fall into a situation encountering the shoots, leaving the principal stem out, by which mode it will take less time to dry. The measure of the cujis regularly is four and a half yards, and the quantity of bundles it will contain, more than 150 or 200. When the first fermentation is over, which is commonly in four days, at which time they are placed very near and almost pressed into the maduraderos (places for ripening,) they should be brought into the tobacco house and placed upon the sticks as separate as possible, that the free air may circulate through them, destroying the bad odor they have acquired by their violent fermentation, and that they may dry with more facility. When the abundance of the collection exacts a place for this preparation, the driest sticks should be collected—those that without inconvenience from the moisture of its juices can be re-united when wished for, and needed to give more capacity to the late ones: this operation has moreover the advantage of concentrating the aromas of the leaves, taking some with others, according to the scarcity of the latest and the superabundance of the most imbued or loaded. The first cut having been made, which is the best, and which is known by the name of the principal or first cut, the stalks should be cut from the flower to the ground, and a general irrigation of them be made, according as the time may be, in order to revive the fertility of the land, blunted in some manner by the strong former growth. By this means, the shoots will be more readily liquidated, and will serve to make the second harvest, which is known by the name capaduras or second cut.

The two most robust should be preferred, leaving entire all above it, covering the wounds of the trunk or stalk with manuring from the fund in the ditches, a portion retained for this purpose, by which operation the shoots will increase with more energy. These shoots should be cultivated in the same manner as the first pruning and topping when the flowers appear, by which process the leaves will increase in a very remarkable manner, and will give another harvest, which, if not so valuable as the first will nevertheless compensate liberally the labor that it has occasioned—selling quick for a class of fillings. These leaves vary much from the first cut by their different form, being longer and more acuminated, the fibres coming out from the principal nerve of the leaf which mechanism is more regular in the leaves of the first cut. A third cutting or harvest can be made from the same stalks again, cutting below the surface of the earth, but good production cannot be obtained for reason of the debility they have experienced, and for the revolution nature makes at the beginning of spring, at which period the third harvest is made: it would be better to turn the stalks in again and arrange things for ploughing and harrowing the land in the same manner as it was done in May. In making the second crop or harvest, either a parallelogram or a portion of plants should be left to seed, that a reproduction of seeds may be obtained for the following harvest, of which collection and preservation I shall hereafter speak.

Two methods are known for selecting tobacco, the one being natural, the other artificial. The last is done at the moment the leaf is perfectly ripe, at whatever time, gathering during the night the number of cujis or sticks that can be benefitted during the following day, placing them in the night upon the scaffolding places that have been made for ripening, that they may receive the night dew, and be softened into a state for culling, opening and selecting. In the morning they should be gathered up and placed in armfuls in a box made of twigs or slats from whence they should be taken for assorting, which should be done in a sheltered place. The natural method, is when the rains have begun, and the moisture of the atmosphere has made the leaves moist, in which state the cujis should be taken from the props or scaffolding, and the tobacco collected in armfuls to be carried to the sheltered place that should be prepared to receive it, and which should be placed upon a heap of dry leaves, to protect them from the moisture of the ground, the chinks of said place should be gauged with twigs, to prevent the entrance of the air and moisture. The armfuls should be placed to the sides, placing the points of the leaves within, in order to preserve them moist. Two files of handfuls should be placed with sprouts towards the wall and exterior part of the quarter, forming a heap, that should not exceed two yards in heighth, the natural weight of which will be sufficient for the pressure that ought to be effected in the first fermentation of the dry leaf, communicating to itself the same time the aroma of the plant concentrated by drying, and which disenvolves itself in consequence of the moisture which has softened them. It is always necessary to form a place, or shed, where it can be sheltered with more nicety, and the precious fruit of so many labors be taken care of with more efficiency.

The time the tobacco should be in this state, will be needed by the proprietor to clear and put in order his fields, to supply the slats, food and provision of eatables for the time of assorting, which should be performed without interruption. These measures will save much expense. Also the field of fields should be renovated, giving to it the same labors, making the same ditches of furrows and placing in all of them the pure horse manure, which had been collected daily during the preceding year, leaving them uncovered some days, and when well soaked, covering them in the manner above referred to.

The seeds which are destined for reproduction will be already ripened, (which will be known by the yellow color of the capsules,) despoiled of the flowers which crowned them. They should be collected, breaking the stalks with the right hand, and placing them in armfuls upon the left arm, when the volume is much, it should be placed in baskets to be carried to the tobacco house, when the bundles should be fastened for hanging on the cujis in the same manner as the tobacco was left to dry perfectly; they should then be examined and placed in barrels until the time of sowing.

Thus the workman, having finished these cares, should commence assorting, taking at night from the pile all the tobacco that can be stripped in a first working, which should be deposited in some boxes constructed at the side of the wall of the saloon, quarter or place appropriated to this business. They should be formed of withes fastened at some distance in the manner of weaving, with corresponding divisions numbering from two to four. In the morning the laborers should be placed on some low seats, placing before each one a portion of stripped leaves, which should be opened and four separations made, according to the size and quality. An individual, intelligent in this business, should examine the two most superior, and divide them with great care, into the first and second, and place them in their respective boxes. The third and fourth classes, the overseers who are intelligent individuals, and have no other office in assorting, should collect and form the bundles in the number of leaves the proprietor wishes, since they have no fixed number in market. Every night should be reported the operation of stripping, because it is more economical to do it when all are together and attending to the same thing, clearing the place of the stalks, litter, &c., which would impede the laborer during the day and having the assorting done with the greatest possible neatness.

When the overseers of the third and fourth class have made a great many bundles, they should go depositing them in their respective boxes, with the heads turned out, in order that the soft points may not be mangled and broken, caring always to arrange them so that the air may not penetrate them. Also when the boxes first and second contain sufficient, by a prudent calculation, to make two or three tierces, they should be wet or sprinkled in the following manner: A bunch of cujis of tobacco should be formed half a yard from the ground and one in width, upon which should be placed leaves sufficient to cover it. Then a fine sponge should be taken very wet, lightly soaked in a liquid, and raising the hand, said leaves should be bedewed with some force, in order that the dew may enter the leaves. Practicing this operation upon both sides of this first bed, and afterwards placing the other, should be placed upon the first, and should be bedewed upon the top, taking that from underneath and placing it upon the top and follow, doing this to the conclusion, covering them with a cloth in order that they may not lose the odor of the composition of bitumen. Having placed a regular quantity of dried leaves of tobacco and aromatic drugs in a barrel of river or well water, which infusion should be stirred many times the first and second day in order to press out the aroma of the drugs, after which they should be left quiet until the liquor has affected a sensible fermentation. The barrel should then be uncovered, and the liquor already pure, should be drawn off to make the irrigation and operation of bitum or bitumen.

The tierces are made in various ways, but the shortest and most regular, is making a box upon a square of coarsely worked timbers, upon whose sides should be placed five pillars for props, leaving the figure in a mould or box. Its size should be regulated to the size of the leaves, placing two that they may touch at their points, lengthening or contracting said mould or box for the heads, from or to the tenon that supports it, and by one spile or peg that subjects it to the place desired. In the bottom of said box should be placed three cords of Majagua bark, with which the tierce may be fastened, and upon which should be placed the two principal slats, and in the sides and subject to the pillars in stays should be placed the other two which form the tierce. The beds of handfuls should be placed with their heads turned outwards, and their points inward, distributing them proportionably to the number it has to hold, according to the quality, and in three beds only. Placed in this order, the staves or slats are doubled from the sides in form of a packet, following those heads that touch in the centre. The cords should be bound with a rational force, to the end that they may not be too closely bound, or the handfuls injured by too close pressure. After this process, the pillars should be loosened by the wedges that retained them, and they should be placed upon some hides or skins, to give them the rope which finishes the process. The tierces should be numbered according to their quality, and should be left some time to the sun to dry the moisture from the slats, being moistened in order to form the tierces: and lastly, they should be placed in the warehouse or place of deposit, upon sleepers, to keep them from the moisture of the ground, being careful to not place too many upon each other, because too great weight might cause them to lose the form, the regular form with which they ought to come from the box, perfectly well made. In the same manner they should avoid being broken, as that would injure them very much.

In the third and fourth class, the operation of bedewing differs, as in these the sheaf or bundles receive the dew although placed upon the same benches, sprinkling them for the night, keeping them piled some time, that they may soak and communicate to each other the balsamic odor of the composition of bitumen.

The tierces of these classes are made in the same manner as the first, with the difference of contracting the box to the size of the leaves.

Calculation of the probable products of Tobacco cultivated by this method.

A parallelogram of two hundred yards in length and fifty in breadth, will contain, at the distance of four-fifths of a yard, one hundred and sixty ditches or furrows, in each one of these, there can be placed one hundred plants at the distance of half a yard.

Sum of plants in a parallelogram,	16,000
Each plant will produce at the least 12 leaves, which we will divide into classes, eight to the first and second, and four to the third and fourth.	
Sum of the leaves, 1st and 2d,	128,000
" " 3d and 4th,	64,000
The third part of the first and second, considered positively of the first quality, and forming a handful to the hundred leaves, will produce four hundred and twenty-six, which sell equivalent to a good dollar each,	$426 00
The two-thirds remaining, considered of the second quality, and a hundred leaves to the handful, will render eight hundred and fifty-three, which being sold at the regular price of four good reals, will amount to four hundred and twenty-six pesos, four reals,	$426 50
The four leaves of the plant or inferior class, compose the sum of four hundred and twenty-six handfuls, composed of a hundred and fifty leaves, and sold at the low price of two reals good, would amount to a hundred and six pesos, four reals,	$106 50
The second cut affords two hundred and fifty-six thousand leaves, holding as I have just said, that each plant, after the cutting, has left upon it two sprouts, and supposing that each one should produce no more than eight useful leaves, there would be sixteen leaves to each plant. This number of leaves would produce a thousand six hundred handfuls, which, being sold at the very low price of two reals, would amount to four hundred pesos,	$400 00

The prime quality,	$426 00	
" second "	426 50	
" third and fourth quality,	106 50	
" second cutting, &c.,	400 00	
		$1,359 00

Cost of production.

Three laborers are sufficient to cultivate one of these parallelograms or 16,000 plants of tobacco. According to the present custom of cultivation, one man is sufficient to attend to 10,000 plants, but in the system of cultivation I recommend, one man is necessary to 5,000 plants.

A laborer hires himself in the country for ten dollars a month, with board, which amounts to fourteen dollars. The three individuals will cost during the year 504 dollars. The rent of the parallelogram is six dollars, which added to the 504 dollars will amount to 510 dollars.

Product,	$1,359
Cost of production,	510
	$849

Being able to plough the land suitably with one horse, and rent free, sixteen parallelograms would amount to the enormous sum of $13,584.

One house of tobacco large enough to contain two thousand cujis of tobacco would cost	$600
Two yoke of oxen,	136
Two thousand neat cujis at a real,	250
Utensils of labor,	200
Incidental expenses	814
	$2,000

The rent necessary is two thousand—rent free and a horse, cultivating by this method at 13,584 dollars, the interest which this capital gains is at 679 dollars to 100.

JULIAN SILVEYRA

APPENDIX No. 10.

SILK.

An Essay on the Culture and Manufacture of Silk, by H. P. BYRAM, *Brandenburg, Meade county, Kentucky.*

Experience of past ages has fully proved that the climate of the United States is as well adapted to the nature and habits of the silk-worm and the production of silk, as that of any other country. Several varieties of the mulberry being indigenous in our soil, and those generally used in the native country of the silk-worm succeed equally well in our own soil and climate. Hence, from the nature and habits of the American people, we must soon become the greatest silk-growing nation on the earth.

The first step towards the production of silk, is to secure a supply of suitable food for the silk-worm.

Having tried all the varieties introduced into our country, I find the morus multicaulis and the Canton varieties, all things considered, most suitable for that purpose.

Propagation of the Mulberry.—Although the experience of some years past has rendered this subject familiar to many, yet those now most likely to engage in the *legitimate* business of silk-growing may be less acquainted with the propagation of the tree. I shall give some brief direction on the subject.

Almost any soil that is high and dry, and that will mature Indian corn, is suitable for the mulberry. That, however, which is inclined to be light or sandy is the best.

The morus multicaulis may be propagated by cuttings or layers, (or a good variety may be raised from the seed.) Cuttings may be of one or more buds, planted perpendicularly, in a light, mellow bed of good soil. They should be planted when the spring has fully opened, or about the usual time of planting corn. They may be planted in the rows, about twelve inches apart, and the rows at a sufficient distance to admit of a thorough cultivation with a plough or cultivator. The ground should be kept mellow until past mid-summer.

Select a suitable piece of ground for a permanent orchard. It would be well if broken up in the fall, and again ploughed in the spring, and, if followed with the subsoil plough, it would be advantageous. After a thorough harrowing it should be laid off in rows each way *eight* feet by *four*, with the plough. The trees at one year old from the nursery should be taken up, the tops cut off near the root, and one planted in each of the squares or hills.

Having tried various methods of planting and different distances, I prefer these here given. This will admit the free use of the plough and cultivator *both ways*.

In latitudes north of 38° or 40°, where land is dear, they may be planted much nearer. If a sufficient quantity of cuttings from old trees cannot at once be procured, the trees from the nursery should be taken up in the fall, and burried in a cellar, or upon the *north side* of a bank or hill, in alternate layers of trees and earth, and the whole protected by a shed from the rains of winter, as the plants seldom sufficiently mature the first season from the cuttings, to withstand the winters of a northern climate, particularly that portion above the ground. South of 38° of latitude these precautions may not be necessary.

The Canton mulberry is a more hardy kind, resembling in some degree, the varieties known as the common Italian, producing a large full thick leaf. This variety is propagated from seed and from layers, but does not readily strike root from cuttings.

In 1838, I procured a quantity of this seed from Canton, which produced a *variety* of plants. Those producing the greatest quantity of fruit yield an inferior leaf.

They are now propagating this variety very extensively at the silk-growing establishment at Economy, Pennsylvania, which, in connection with the morus multicaulis, constitute the principal food used at this establishment.

The fruit should be gathered when fully ripe, and the seed washed out and dried. If south of the thirty-ninth parallel of latitude, they may be planted the same season. North of this, they should be planted in the following spring, in a bed of rich earth prepared as for beets or onions, and planted in drills about *eighteen inches* apart. The young plants should be thinned to the distance of from *one* to *three* inches from each other. They should be well cultivated, when they will attain the height of three or four feet the first season. In the fall, in a northern climate, the young trees should be taken up and protected during the winter, as directed for the morus multicaulis.

In the following spring the branches may be taken off *near* the main stem, the top shortened, and the whole tree planted, completely covering the roots and the main stem from one to two inches deep. In this way two or more trees may be produced from each plant. If a full supply can be procured, the *roots* of the young plants may at once be removed to the orchard. They may be allowed to stand much nearer than the multicaulis, leaving only sufficient room for cultivation.

When seed is required it would be well to plant out a portion from the seed bed at once, as standards for this purpose, always selecting those bearing *full heart-shaped* leaves.

The leaves of the white Italian produce a good heavy cocoon, and should always be used in the last age of the worms when *other larger leaved* varieties cannot be obtained.

Cultivation.—The mulberry orchard should be *annually* cultivated. The ground kept mellow and free from weeds until the middle of July.

The fields should be divided into *three* equal parts, and after the second season from planting, *one-third each year* should be cut down near the ground. This will cause a more vigorous growth, and an abundant crop of foliage.

Feeding Apartments.—Various plans have been proposed and adopted for cocooneries or feeding-sheds for the silk-worm; none of which, I think are without objection, except a perfect laboratory, so constructed as to be able to fully control the atmosphere and temperature within. These, however, would be too expensive, and require too much skill and judgment for general adoption.

Open or shed-feeding has been employed with some success of late years, and for general use may be the most successful for family establishments. This, however, confines the whole business particularly in the northern states, to one or two crops in the season. South of Ohio, more can be successfully fed.

These sheds may be cheaply made, by setting some durable posts in the ground, say from six to eight feet high, with a roof of shingles or boards. The roof should project two feet over the sides. There should be some temporary protection to the ends and sides of the shed, perhaps the best and cheapest can be made of strong cotton cloth, (osnaburg;) three or four widths should be sewed together, with small rods across the bottom which will answer as weights, and also as rollers, which, by the aid of a pulley may be rolled up or let down at pleasure.

The width of the sheds must be governed by the size of the hurdles or feeding trays used. The width that I have adopted is from eighteen to twenty feet. The length according to the extent of the feeding contemplated.

Where it is designed to carry on an extensive business, a building should be constructed expressly for the purpose. It should be on an elevated situation, convenient to the mulberry orchard. There should be a cellar under the building. Any material commonly used for building may be employed. If of wood, weather-boarded and plastered. It would be well to fill up the space between the two with tan bark or unburnt brick, or something of the kind, which will render the temperature more uniform. The width of the building should be twenty or twenty-eight feet. The former admitting of *two*, and the latter of *three double ranges* of hurdles or trays of suitable size. The length suited to the extent of the business designed. It should be two stories high, and so constructed as to be thoroughly ventilated. There should be two double doors in each end, with doors, windows, and ventilators in the sides. The windows should extend to near the top of the rooms. There should be sliding ventilators near the floor. The windows may be filled with oiled paper or cloth, which will admit the light and exclude the sun. It would also be important to have under each tier of hurdles, through the floor, two planks of ten inches width each, hung with hinges that they may be raised at pleasure by a pulley. Also an upright ventilator on the roof, fitted with blinds, through which a constant draft may be kept up.

In one end of the building in *each* of the two doors there should be a ventilating wheel made of thin boards, (plank,) much after the form of the wheels applied to the stern of our steam propellers. These wheels should be about two feet in diameter. They should be put in motion for a few minutes every hour, or oftener in still weather. Both may be made to turn by one crank, connecting each by bands and whirls to the main shaft.

An air furnace, such as is now employed in heating churches and other buildings, should be constructed in the cellar, and so arranged as to draw directly from the feeding-rooms all the air necessary to supply the furnace. The air, when heated in the chamber, should be conveyed through the whole length of the rooms, in a square pipe with openings at short distances from each other, which should increase in size as they recede from the furnace. These openings may be so connected as to be all closed at once, or a valve applied at the air-chamber may be used to cut off the communication of heated air when the temperature is sufficiently high in the room, suffering the hot air to escape outside of the building. In the last ages of the worms the furnace will be found of great benefit, even when the heat is not required in the rooms, for the purpose of drawing off and consuming the impure air of the cocoonery.

At Economy, they not only make use of air-furnaces, but in an adjoining building they have a large air-pump constantly in operation, connected with the cocoonery by a pipe with small openings through the length of the building. This pump is kept in motion by a steam engine.

With good eggs, when proper means have been employed for their preservation and the feeding apartments thoroughly ventilated, I do not know of a single instance where the worms have proved unhealthy.

From the conviction that proper regard had not generally been paid to the ventilation of cocooneries, in the summer of 1842 I commenced a series of experiments by which I ascertained that the silk worm, during its last age, consumed *nearly* its *own weight* of *leaves daily;* and that the amount of exhalations or *imperceptible perspiration* given off in *proportion* to the quantity of food consumed, was about equal to that ascertained to escape from a healthy man.

I found, from the most carefully conducted experiments, that the weight of one hundred thousand silk worms, about five days before their time of winding, was four hundred and fifty-eight pounds, and that they would consume daily three hundred and seventy-two pounds of leaves,* and that their *increased weight* in *twenty-four hours* from the food consumed was *forty-six pounds;* and that the enormous amount of *two hundred and six pounds* was given off in the same time, in the form of *exhalations* or *imperceptible perspiration* alone. This, then, I think, fully explains the cause of disease complained of by many, and establishes the importance of ventilation in every possible form.

In one corner of the building there should be a hatching room, with which the furnace below should be connected, so as to receive a greater or less degree of heat, as may be required, without reference to the temperature of the feeding rooms.

Fixtures.—In fitting up the hurdles or feeding-shelves for a building of *twenty feet* wide; it will require a double range of posts two and a half or three inches square, on each side of the centre of the room, running lengthwise, and the length of the shelves apart, in the ranges, and each two corresponding posts, crosswise of the ranges, about the width of the two shelves apart. On each double range across the posts are nailed strips, one inch or more in width and about *fifteen* inches apart, on which the trays or hurdles rest, which may be drawn out or slid in as may be found necessary in feeding. The aisles or passages of a building of the above width will be four feet each, allowing two feet for the width of each *single* hurdle.

The hurdles that I have used for many years are of twine net-work. A frame is first made five feet long and two feet wide, of boards seven-eighths of an inch thick, and one and a half inches wide. There should be two braces across the frame at equal distances of five-eighths by seven-eighths of an inch square. On a line about *half an inch* from the inner edge of the frame are driven tacks *nearly* down to their heads, at such distances as will make the meshes of the net about three-quarters of an inch square. Good hemp or flax twine is passed around these tacks, forming a net by passing the filling *double* over and under the warp, or that part of the twine that runs lengthwise. This twine should be somewhat smaller than that running lengthwise. On a damp day the twine becomes tight; I then give the netting two good coats of shellac varnish. This cements the whole together and renders it firm and durable.

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* Had these worms been fed in the ordinary manner they would have consumed many more leaves in the same time. But to preserve the greatest possible accuracy, through the whole experiment, they were fed rather sparingly

The varnish is made by dissolving a quantity of gum shellac in alcohol in a tin-covered vessel, and placed near the fire. It should be reduced, when used, to the consistence of paint.

Another set of frames are made in the same way and of the same size, and covered with strong cotton or tow cloth; this is secured with small tacks. Upon these the net frames rest, which serve to catch the litter that falls through from the worms.

Hurdles made and supported in this manner admit of a more free circulation of air, and the litter is less liable to mould or ferment, and can be removed and cleaned at pleasure.

With this kind of hurdle and screen, I make use of winding frames, constructed in the following manner: A light frame is made of boards one and a half inches wide, and the length of the hurdles, and *two feet* and *four inches* wide; this is filled crosswise with thin laths about one inch apart in the clear. The manner of using these will be hereafter explained. They answer the two-fold purpose of winding frames and mounting ladders.

The care and expense required in fitting up a house on this plan may prevent its *general* adoption.

The most common method that has been heretofore employed is permanent shelves, but the labor required to keep the worms properly cleaned renders this plan objectionable.

At Economy, Pennsylvania, the rearing of the silk worm is now carried on to a great extent and more successfully than in any other part of the United States, or perhaps the world. Their houses are two stories high. The worms are fed on small trays about eighteen or twenty inches wide, and about three feet long. They are supported in the same manner as the hurdles above described, and are about six inches apart. When the worms are about ready to wind, they are transferred to the upper story, to permanent shelves, about sixteen inches apart, where they form their cocoons in bunches of straw placed upright between the shelves. The worms are cleaned at least once after every moulting, and after the last, every day. For this purpose they have nets wove or knit, of cotton twine, something larger than the size of the trays, with meshes of various sizes suited to the age of the worms. For the last age they are about three-quarters of an inch square. These are used without frames. When it is required to remove the worms from their litter, the nets are laid lightly over them, and then plentifully fed. When the worms have arisen upon the fresh leaves, they are removed by two persons taking hold of the four corners of the net and transferring them to clean trays, held and carried off by a third person. One hundred thousand are changed in this manner in two hours.

Description of the Silk Worm.—It will be necessary for the inexperienced culturist to have some knowledge of the forms, changes, and appearances of the silk worm before he enters upon the duties of his interesting charge.

The silk worm is a species of caterpillar, whose life is one continual succession of changes, which, in due time, becomes a moth or winged insect, like others of the genus.

The time occupied in going through its different forms of existence varies in different countries—governed by climate, temperature, and the quality and quantity of the food upon which it is fed, and the nature of the particular variety of the insect.

The worm changes or casts its skin (of the common varieties) four times before it attains its full growth. These changes are called moultings, and the periods intervening between the several moultings are termed ages. When it is first hatched it is of a blackish color, which afterwards becomes lighter, varying almost daily to different shades, and in different varieties through every age, to the close of the last, or near the time of spinning, when it assumes a grayish yellow semi-transparent appearance.

Having tried all the varieties that have been introduced into the United States, those I consider the best are known as the *Chinese imperial*, producing a large salmon colored peanut shaped cocoon; and a kind called the peanut, producing a mixture of white and salmon-colored cocoons. This variety produces a larger and more firm cocoon than any of that name that I have seen.

Time of Hatching—Rearing.—When the leaves of the mulberry have put forth, to the size of about an inch in diameter, it may be generally inferred that the proper time for hatching the worm has arrived.

The papers or cloths containing the eggs should then be brought out and placed in the hatching room, upon a table or trays made for the purpose. When artificial means are employed, the temperature should be *gradually* raised until the time of hatching, which will be in about ten days, to 75° or 80° of Fahrenheit's thermometer. But few worms will make their appearance on the first day, but on the second and third the most will come out; should there be a few remaining unhatched on the fourth day they may be thrown away, as they do not always produce strong and healthy worms. When the worms begin to make their appearance, young mulberry leaves cut into narrow strips should be laid over them, to which they will readily attach themselves; these should be carefully removed and placed *compactly* upon a cloth screen or tray, prepared for them, and other leaves placed upon the eggs, for the worms that still remain, which should be passed off as before. A singular fact will be observed, that all the worms will hatch between sunrise and before noon of each day. Care should be taken to keep the worms of each day's hatching by themselves, as it is of the greatest importance to have the moultings and changes of all the worms as simultaneous as possible. It is also important that the worms that have been transferred to the trays should *not* be fed until the hatching for the day is completed, so that all may be fed equally. Young and tender leaves should be selected to feed the worms with; these should be cut with a sharp knife into pieces not exceeding a quarter of an inch square, and evenly sifted over them. They should be fed in this way *six* or *eight* times in *twenty-four* hours, as near as possible at regular and stated periods.

It will be impossible to lay down any definite rules for the quantity of leaves necessary for a given number of worms for each succeeding day, through every age. After a little acquaintance with their nature and habits, the intelligence and judgment of the attendant will be the best guide; they should, however, have as much as they will eat, but after a few days, care should be taken not to give them more than they will generally consume, as this will increase the accumulation of litter, which will endanger the health of the worms. In the last age they eat voraciously, when they should be well supplied. A quantity of leaves should always be on hand in case of wet weather.

When the average range of the thermometer is between 70° and 80°, the several moultings will take place near the fifth, ninth, fifteenth, and twenty-second days after hatching. It may be known when the worms are about to cast their skins, as they cease to eat and remain stationary, with their heads raised and occasionally shaking them. This operation will be more distinctly observed as they increase in size, through their succeeding ages.

Assuming the above temperature as the standard, the quantity of leaves for the three first days of this (the first) age must be gradually increased at each feeding, after which they will require less at each succeeding meal until the time of moulting arrives, when, for about twenty-four hours, they eat nothing. But as it is seldom the case that all cast their skins at one and the same time, some will still be disposed to eat, when a few leaves must be *cut fine*, and *sparingly* scattered over them, so that those that remain torpid may be disturbed as little as possible. They must now be carefully fed in this way until it is discovered that *some* have moulted, when the feeding must *cease altogether* until the *most* of them have recovered. This rule must be *particularly* regarded through all the succeeding moultings, otherwise some of the worms will be far in advance of others; and this want of uniformity will *increase* throughout each succeeding age, and to the period of winding, which will not only result in great inconvenience in gathering the cocoons, but will materially injure the worms, and consequently lessen the crop of silk.

When the *greatest portion* of the worms have moulted and appear active, leaves a little wilted are laid over them, by which they are passed to clean trays. If any still remain that *have moulted*, they must be transferred in the same manner, by laying more leaves upon them. The remnant of worms that *have not* changed their skins, should be left upon the litter, and added to those of the next day's moulting. By closely regarding these rules throughout the several ages, the worms will generally all commence the formation of the cocoons about the same period.

After having gone through and furnished all the worms with a quantity of leaves, it is well to go over a second time and add more where they seem to require it.

Very young and tender leaves must be given to the worms in the first age; after which older ones can be given, as they advance in age, until after the last moulting, when they should be fed upon sound full-grown leaves.

After the second moulting, the leaves, where large crops are fed, may be cut by running them twice through a common *rotary* hay or straw-cutter of Hovey's, or one of a similar make.

The worms will frequently heap together and become too thick, as they increase in size; when they are fed, the leaves must be spread and the space enlarged, or they may be removed by leaves or twigs of the mulberry to places unoccupied. If they are permitted to be crowded, disease is apt to follow, and the whole crop endangered.

It will sometimes be observed, when the light falls more directly on one side of the hurdle than the other, that the worms will incline to leave that side and become crowded on the opposite, when the hurdle should be turned around.

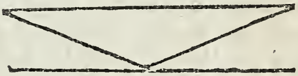
Up to the last moulting it is best to feed the worms entirely upon the leaves of the multicaulis; after which the Canton or white Italian should be used, if a full supply can be obtained—the former being consumed with greater avidity, and the accumulation of litter is consequently less. The Canton and Italian produce the heaviest cocoon, while the multicaulis yields a finer and stronger fibre. In pursuing this course, the advantages of both are in some degree secured.

The worms should be removed from their litter immediately after each moulting, and in their fourth age the hurdles should be cleaned a second time, and after the last moulting they should be removed at *least* every *second day.*

Where nets are not used, in the last ages the worms are changed, by laying over them the small branches of the mulberry.

Recently branch feeding, as it is termed, has been introduced with some success and with great economy of time; in the last ages of the worms, care should be taken to lay the branches as evenly as possible, especially where it is designed to use twine hurdles, otherwise it will be difficult for the worms to ascend through the netting.

When the worms are about to spin, they present something of a yellowish appearance; they refuse to eat and wander about in pursuit of a hiding place, and throw out fibres of silk upon the leaves. The hurdles should now be thoroughly cleaned for the last time, and something prepared for them to form their cocoons in. Various plans have been proposed for this purpose. The lath frames, before described, I prefer. They are used by resting the back edge of the frame upon the hurdle, where the two meet in the double range, and raising the front edge up to the under side of the hurdle above, which is held to its place by two small wire hooks attached to the edge of the hurdle, showing an end view thus:



A covering of paper or cloth should be applied to the lath frames. In using the hurdles and screens, I remove the screen from under the hurdle, turning the other side up, and letting it down directly upon the winding frame. This affords double the room for the worms to wind in. Lath frames of this description have advantages that no other fixtures for winding possess that I have ever seen tried. The frame resting upon the back side of each hurdle renders this side more dark, which places the worms instinctively seek, when they meet with the ends of the laths and immediately ascend to convenient places for the formation of their cocoons. From these frames the cocoons are gathered with great facility, and free from litter and dirt, and when they are required they are put up with great expedition.

Where branch feeding has been adopted by some, no other accommodation has been provided for the winding of the worms than that afforded them by the branches from which they have fed. This is decidedly objectionable, as the worms are always disposed to rise until their course is obstructed above. When this is not the case, they wander about for hours upon the tops of the branches, and only descend after their strength becomes exhausted, and the result is, the production of a crop of loose inferior cocoons. Next to lath frames, small bunches of straw afford the best accommodation for this purpose. Rye straw is preferred. Take a small bunch about the size of the little finger, and with some strong twine tie it firmly about half an inch from the butt of the straw; cut the bunch off about half an inch longer than the distance between the hurdles. They are thus placed upright with their butt ends downwards, with their tops spreading out, interlacing each other, and pressing against the hurdles above. They should be thickly set in *double rows* about sixteen inches apart, across the hurdles. These may be preserved for a number of years.

After the most of the worms have arisen, the few remaining may be removed to hurdles by themselves. In three or four days the cocoons may be gathered. While gathering, those designed for eggs should be selected. Those of firm and fine texture with round hard ends are the best. The smaller cocoons most generally produce the male, and those larger and more full at the ends, the female insect. Each healthy female moth will lay from four hundred to six hundred eggs. But it is not always safe to calculate on one half of the cocoons to produce female moths. Therefore it is well to save an extra number to insure a supply of eggs.

The cocoons intended for eggs should be stripped of their floss or loose tow, which consists of irregular fibres, by which the worm attaches its work to whatever place it is about to form its cocoon. These should be placed on hurdles, in a thin layer, and in about two weeks the moths will come out; always in the forepart of the day, and generally before the sun is two hours high. If laid upon a net hurdle (which is best) they will immediately fall through the meshes and remain suspended on the under side, where they are not liable to become entangled in the cocoons. As soon as the male finds the female they become united. They should be taken carefully by the wings, in pairs, and placed upon sheets of paper, to remain until *near* night, when the female will be anxious to lay her eggs. Then take each gently by the wings and separate them, placing the females at regular distances, about two inches from each other, upon sheets of paper or fine cotton or linen cloth; these should hang over a line, or be tacked to the side of the house. In two or three nights the moths will complete their laying, when they should be removed from the papers or cloths. Frequently the males appear first in the greatest numbers, some of which should be reserved each day, in case there should afterwards be an excess of females. They should be shut out from the light, otherwise they are liable to injure themselves by a constant fluttering of their wings. The female is largest, and seldom moves or flutters.

Killing the Chrysalides.—After the cocoons have been gathered, those that are intended for sale, or for future reeling, must be submitted to some process by which the moths will be killed, otherwise they will perforate and spoil the cocoons. This is done by various methods. The most simple and convenient is to spread them thinly on boards, and expose them to the direct rays of the sun. In a hot day many of them will be killed in a few hours, but they must be stirred occasionally, or some will be liable to escape the heat, and afterwards come out. At Economy they place them in an *air-tight* box containing about ten bushels, (the box should always be full, or if not, a partition is fitted down to the cocoons,) sprinkling *evenly through* the *whole*, beginning at the bottom, about three ounces of camphor, slightly moistened with alcohol, and finely pulverised. The box is then closed, and the seams of the top covered by pasting strips of paper over them. They remain in this way about three or four days. They are then spread out thinly in an upper loft to cure, where they should be occasionally stirred. It will require some weeks to thoroughly cure them. Before camphoring, the dead and bad cocoons must be taken out, otherwise they will spoil the good ones.

When it is convenient, it is best to reel as many of the cocoons as possible immediately after they are gathered, as they reel much more freely, before they are exposed to the sun or dried.

Succession of Crops.—Preservation of Eggs.—Repeated attempts have been made to feed a succession of crops of worms throughout the entire season from the same stock of eggs. In most instances success has failed to attend these efforts. When proper means are employed and due care observed, the eggs may be preserved and worms successfully raised until the feed is destroyed by the frost. In many years' experience I have never failed in this respect.

In the spring of 1840 I communicated to Miss Rapp, of Economy, my method of preserving eggs, which she immediately adopted, and has pursued it until the present time with perfect success, feeding from eighteen to twenty-five crops each year. The following is an extract of a letter from the postmaster at Economy, dated January 19th, 1843.

"Between May and September, we raised near *two millions* of worms, in eighteen sets, of near equal numbers, about a week apart, producing three hundred and seventy-one bushels of cocoons. The last crop hatched the 9th of September and spun the 10th of October. We found no difference in the health of the different sorts. We are of the opinion that the late keeping of the eggs does not bring disease on the worms, if they are kept right, and gradually brought forward as they ought to be."

It may be remarked that the qualities of the mulberry leaf are such in the latter part of the season that as heavy cocoons will not be produced as in the first. A bushel of the first crop raised at Economy, in the season referred to, produced twenty-three and a quarter ounces of reeled silk, and the last crop, wound in October, but nineteen ounces. About one month of the best part of that season of feeding was lost by the severe frost that occurred on the 5th of May, which entirely killed the young leaves, and must have materially injured the whole crop of the season.

My method of preserving eggs is to place them in the ice house in February, or early in March or sooner if the weather is warm. For this purpose a box or square trunk is made, extending from within *one foot* of the *bottom* of the ice to the top. This may be made in joints, so that as the ice settles the upper joints may be removed. The eggs should be placed in a tin box, and this enclosed in a wood one, and suspended in the trunk near the ice. The communication of warm air should be cut off by filling the opening with a bundle of straw or hay. The eggs should be aired for a few minutes, as often as once in one or two weeks, always choosing a cool dry morning; when selections for succeeding crops may be made, these should be placed in another box and gradually raised in the trunk for several days, avoiding a too sudden transition from the ice to the temperature of the hatching-room.

Their ice-house at Economy is connected with the cellar, the bottom of the former being eighteen inches below that of the latter. A long wooden box extending into the ice-house, level with the bottom of the cellar floor, contains all the smaller boxes of eggs. The door of the box, opening in the cellar, is kept well closed to prevent the admission of warm air. They employ another ice-house, sunk deep in the cellar, with shelves gradually rising from the ice up to the top of the ground, upon which the eggs of succeeding crops are placed, and raised one shelf higher every day, until they are taken into the hatching room. The past season they have hatched about *five ounces* of eggs, or one hundred thousand worms every four days.

iseases of the Silk Worm.—The silk worm, like every other animal or insect is liable to disease and premature death. European writers have enumerated and described six particular diseases to which it is subject. But in our more congenial climate nothing is wanting to insure a healthy stock of silk worms, and a profitable return from their labors, but to give them *sufficient room, a regular and full supply of suitable food, a strict regard to cleanliness, and a proper ventilation of their apartments.*

In excessively hot, damp, or sultry weather, in the last age, the disease known as the *yellows* sometimes occurs. Where open feeding is adopted some fine *air-slacked lime* may be sifted on the worms once or twice a day, *before feeding*, and the diseased and dead worms picked out and thrown away. In a regular cocoonery, properly ventilated and supplied with an air furnace, dry air should be made to circulate freely. But if the temperature is above eighty or eighty-five degrees, the ventilating apparatus should be constantly employed until a change of weather occurs, or the disease disappears.

A feeding house should be so arranged as to cut off all communication of rats and mice from the worms and the cocoons.

Reeling.—We have now arrived at another branch of the silk business, which more properly comes under the head of manufacturing. Every farmer who engages in the silk culture, in order to avail himself of an additional profit, should provide his family with a suitable reel, by the use of which, after a little experience, he will be enabled to offer his silk in market, in a form that will greatly enhance its value, and much reduce the trouble and expense of transportation. Reels can now be procured in almost any of the principal cities at a small cost, or they can be made by any ingenious farmer or carpenter. The reel now uniformly used is that known as the Piedmontese.

All attempts to improve this reel in its general principles, I believe, have failed. At Economy, however, they have made an addition which may be found useful. It consists of *two pair* of whirls, made of wire, in the form of an aspel to a reel, about *four* inches long and two and a half inches across at the ends, the wires being bent in the middle, leaving them about one and a half inches across from arm to arm, making the circumference about six inches. These whirls are set in an iron frame, and run *each* upon two points or centres. Each pair is set equidistant, on a direct line, about eight inches apart, between the first guides and those on the traverse bar, instead of making the usual number of turns around each thread, as they pass between the guides on the reel. With this arrangement, each thread is taken from the basin and passed through the first guides, then carried *over and around* the two whirls, and where they *pass* each other *on the top*, the *turns* are made necessary to give firmness to the thread, then passing directly through the guides in the traverse bar to the arms of the reel, making each thread in reeling independent of the other. This enables the reeler, when a remnant of cocoons are to be finished on leaving the work, to unite both threads into one, retaining the necessary size; whereas both would be too fine if continued on the reel in the ordinary manner.

Directions for reeling.—In family establishments, a common clay or iron furnace should be procured, to which should be fitted a sheet-iron top, about twelve inches high, with a door on one side, and a small pipe on the opposite side to convey off the smoke; this top should retain the same bevel or flare as the furnace, so as to be about twenty inches in diameter at the top. The pan should be twenty inches square and six inches deep, divided into four apartments, two of which should be one inch larger one way than the others. They should all communicate with each other at the bottom.

In large filiatures, a small steam engine to propel the reels, &c., and to heat the water for reeling would be necessary.

Before the operation of reeling is commenced, the cocoons must be stripped of their floss, and assorted into three separate parcels, according to quality, or of different degrees of firmness. The double cocoons or those formed by two or more worms spinning together, the fibres crossing each other and rendering them difficult to reel; these should be laid aside to be manufactured in a different manner.

After the cocoons have been assorted as above directed, the operation of reeling may be commenced. The basin should be nearly filled with the *softest* water, and kept to a proper heat by burning charcoal, or some other convenient method of keeping up a regular heat. The precise temperature cannot be ascertained until the reeling is commenced, owing to the different qualities of cocoons; those of the best quality will require a greater degree of heat than those of a more loose and open texture; hence the importance of assisting them. Cocoons also require less heat, and reel much better, when done before the chrysalides are killed, and the cocoons become dried.

The heat of the water may be raised to *near* the boiling point, (it should never be allowed to boil,) when two or three handfuls of cocoons may be thrown into one of the large apartments of the basin, which must be gently pressed under water for a few minutes, with a little brush, made of broom corn, with the ends shortened. The heat of the water will soon soften the gum of the silk, and thereby loosen the ends of the filaments; the reeler should then gently stir the cocoons with the brush, until the loose fibres adhere to it; they are then separated from the brush, holding the filaments in the left hand, while the cocoons are carefully combed down between the fingers of the right hand, as they are raised out of the water. This is continued until the floss or false ends are all drawn off, and the fine silk begins to appear; the fibres are then broken off and laid over the edge of the basin. The floss is then cleared from the brush and laid aside as refuse silk, and the operation continued until most of the ends are thus collected.

If the silk is designed for sewings, about twenty-five fibres should compose a thread; if intended for other fabrics, from eight to fifteen should be reeled together. The finer silk should always be reeled from the best cocoons. The cocoons composing the threads are taken up in a small tin skimmer, made for the purpose, and passed from the large apartment of the basin to those directly under the guides. As the ends become broken they are passed back into the spare apartment, where they are again collected to be returned to the reel. The requisite number of fibres thus collected for *two* threads are passed, each, through the lower guides. They are then wound around each other two or three times, and each carried through the two guides in the traverse bar, and then attached to the arms of the reel. The turning should now be commenced with a slow and steady motion, until the threads run freely. While the reel is turning, the person attending the cocoons must continually be adding fresh ends, as they may be required, not waiting until the number she began with is reduced, because the internal fibres are much finer than those composing the external layers. In adding new ends, the reeler must attach them, by gently pressing them, with a little turn between the thumb and finger, to the threads as they are running. As the silk is reeled off, the chrysalides should be taken out of the basin, otherwise they obscure and thicken the water and injure the color and lustre of the silk. When the water becomes discolored it should always be changed.

If, in reeling, the silk leaves the cocoon in burs or bunches, it is evident the water is too hot; or when the ends cannot be easily collected with the brush, or, when found, do not run freely, the water is too cold.

A pail of cold water should always be at hand, to be added to the basin as it may be required. When the cocoons yield their fibres freely, the reel may be turned with a quicker motion. The quicker the motion, the smoother and better will be the silk. When from four to six ounces have been reeled, the aspel may be taken off, that the silk may dry. The end should be fastened so as to be readily found. Squeeze the silk together and loosen it upon the bars; then on the opposite side tie it with a band of refuse silk or yarn, then slide it off the reel, double, and again tie it near each extremity.

The *quality* of the silk depends much upon the art and skilful management of the reeler. All that is required to render one perfect in the art of reeling, is a little *practice*, accompanied at the beginning with a degree of *patience*, and the exercise of *judgment* in keeping up the proper temperature of water, and the threads of a uniform size.

Manufacture of perforated cocoons.—The perforated and double cocoons can be manufactured into various fabrics, such as stockings, gloves, undershirts, and the like. Before the cocoons can be spun, they must be put into a clean bag, made of some open cloth, and placed in a pot or kettle, and *covered* with soft water, with soap (hard or soft) added, sufficient to make a strong suds, and boiled for about three or four hours. If they are required to be very nice and white, the water may be changed, and a small quantity more of soap added, and again boiled for a few minutes. After they are boiled, they may be hung up and drained; they should then be rinsed while in the bag, in fair water, and hung out to dry, without disturbing them in the bag. When completely dry, they may be spun on the common flax wheel, by first taking the cocoon in the fingers, and *slightly* loosening the fibres that become flattened down by boiling, and then spinning off from the *pierced end*. The silk will run entirely off, leaving the shell bare.

The double cocoons may be spun in the same manner, but should be boiled separately.

MANAGEMENT OF A COCOONERY.

Mackshill Cocoonery, near Reading,
Hamilton Co., Ohio, Nov. 17, 1845.

E. J. Hooper,

Dear Sir: Agreeably to your request, I will give my mode of silk growing. I have been feeding, for the last six years, with varied success. I have tried a number of plans and find the more simple the plan the better. I use Morris' Burlington frame, and think it decidedly the best I have [illegible]en or tried. First—have good eggs, well kept, and do not let them hatch till warm weather has fairly set in—say from tenth to twenty-fifth of May, as the season may be. As soon as they are hatched, lay on leaves and move them on to clean papers by lifting the leaves. Be careful not to get them too thick, or you cannot feed them enough without covering them too deep with leaves. Move and spread them every day, except when they are moulting. Feed often with fresh leaves, give them all the air you can, so that they do not blow away. After the first moulting, feed with short, tender, twigs. They are easily moved and spread with the twigs in the morning when they are hungry. If they are neglected while young it is useless to feed them while they are old. I believe that all the diseases I have had among my worms were caused by neglect, or by keeping them in a close building where there was not enough pure air. After they pass the second moulting, if they are fed with care, they will eat the leaves so clean that they will need to be moved but once between each moulting, and that should be done just before they moult; but should their bed become foul, move them by all means.

I keep each day's hatching separate. The first day but few worms will hatch, and they serve as a guide for all the rest. When they commence moulting, you can move the others on clean papers before they commence moulting.

If the worms are well fed and not too thick on the papers, and the weather warm, they will moult nearly at the same time; that is, each day's hatching, and when they are kept separate and the papers marked 1st, 2d and 3d day, &c., you can feed them as they ought to be fed, and when they commence winding you can put up the bushes for them to wind in, as each lot commences. They will not all need them at once as they would if all ages were mixed. When all the frames commence winding at once they cannot be attended to in time, and many worms will be lost if there is no place provided for them. They will crawl over the frames and waste their silk; even if they make a cocoon it will be of but little value.

After the third moulting, feed with branches as long as they will lay on the frames. Keep the bed as even as possible. Let no leaves hang over the frame, lest some of the worms crawl out on them, others will cut them off, and leaves and worms will fall together to the ground.

When the worms get too large to lift with the branches, and they want moving, I place five strips, three-eighths or one-half inch square, across the frames, (the frames are three by four feet,) the strips are three feet four inches long; so as to extend two inches over the frame on each side. Sift lime over the whole bed till it is all white, worms and all; then lay branches lengthwise of the frame across the five strips. After feeding a few times the worms will all be on a new bed; they will not stay among the lime in the old bed. They are then ready to move.

Have a few duplicate frames ready; lay two sheets of heavy brown paper that will cover the frame: if you could get one large enough to cover the frame it would be better. Give the worms a good feed, and as they come upon the upper bed, place two strips, four feet long, under the ends of the five cross strips. Two persons can then raise the worms up, while the third person slips the frame and old bed out and places one of the duplicates in its place. The worms can then be let down, and they will keep eating as if nothing had happened. If it becomes necessary to move them suddenly, have four or five sharp pointed sticks, slip them through the bed of branches just below the worms; then proceed as before. Pick off what few worms remain on the frame; throw off the litter, and the frame is ready for the next move. They should be moved just before the bushes are put up for them to wind in, and give them a good coat of lime, it keeps the bed from moulding, and they will not wind in it; for the cocoons that are made in their bed, if it is damp weather, are poor things. Cane brush is the best for them to wind in. When that cannot be had, cut oak limbs; lay them in the sun to wilt: if they are put up green and the worm commences winding in them the leaves curl and the worm has to leave its place to find a better, and will seldom begin again. Cut the brush of the right length to spring in between the frames. The frames should be eighteen inches apart, three tier, one above the other, the lower one two feet from the ground. When feeding, after the brush are put up, lay the but end of the multicaulis branches, (nothing else is worth feeding with,) snug to the oak bushes, that the worms can get to them when they want to wind. After most of the worms on a frame are gone up, pick off the rest and mark the frame: in four days gather the cocoons, if the weather is warm; if not, in six days. Having the oldest worms in the upper tier, you can take them down without disturbing the rest.

After the cocoons are gathered, I select the best for seed. When the millers come out, I throw all the poor ones out, if there is any. The papers intended for the eggs, are hung up to keep them clean, and there will be nothing on them but the eggs. I have a few ounces of eggs from the cocoons you saw in the bushes when you were here.

They are as good as I ever saw. I propose leaving some with you for sale this winter. They are the nankeen-peanut. To keep eggs from hatching in summer, roll the papers in cotton batting, put it in a wooden box and place them in an ice house on the ice; cover it with straw and they will keep well. The cocoons intended for reeling are put in the sun as soon as they are gathered; spread them thin, and a few days will kill the crysalis. They must be well dried or they will mould. The pea-nut being much firmer and heavier, takes longer to kill and dry than any other variety. To sum up the whole: have good, well-kept eggs; give them plenty of room, (an ounce of eggs, when the worms are full grown, should have twenty-five frames, three by four feet, to feed and wind on.)

This is very essential. Keep them clean; feed in an open building; close it only when it is very windy. Cultivate your *trees* well; if they are not thrifty the worms will not be; yellow leaves will not do. Feed the worms all they will eat from the start. I feed the leaves wet or dry as they come. It is better to have them leave some, than not have enough. Have a good place for them to wind in; and if the weather is warm and uniform, the worms will do *their* part. If any are diseased, pick them off. I am frequently asked: "Is it profitable?"

My answer is, it will pay as well as any other farm operation. Should you or any other person want any further information I possess on the subject, I shall be happy to communicate it.

JOSEPH McHANNON.

From the Woonsocket (R. I.) Patriot

SILK MANUFACTURES.

The time is rapidly approachiug when this nation will not be dependent on Europe for its consumption of manufactured silk goods, but, on the contrary, will supply herself, and have a surplus for exportation to other portions of the globe. This business, like all other branches of manufacturing industry, has struggled against adverse fortune, and counteracted difficulties not contemplated by its early founders. But we believe for the past year or two the manufacture of sewing silk has been highly prosperous, and several new mills have been erected in different sections of the country. In Tolland county, Conn., there are six factories, which respectively turn off the following amounts of sewing silk and twist per annum:

Vyse & Sons, at Willington,	12,000	pounds.
Rixford & Butler, at Mansfield,	5,000	do.
William Atwood, “	3,700	do.
Zalmon, Storrs & Son, “	2,000	do.
J. & E. Hovey, “	1,500	do.
Chaffee & Co., “	1,000	do.

In addition to these we will enumerate the remaining establishments which we know to be in operation in different sections of the United States, with a probably correct estimate of the amount of goods manufactured per annum:

Cheney & Brotners, Manchester, Conn.,	16,000	pounds.
A. B. Jones, do do	2,500	“
Sowerby & Co., Northampton, Mass.,	7,000	“
Joseph Conant, do do	3,500	“
————, New Haven, Conn.,	1,500	“
William Dale, New York city,	2,500	“
Murry & Co., Patterson, N. J.,	10,000	“
Livesy & Co., Canton, Mass.,	2,000	“
B. & A. Hooley, Philadelphia,	3,000	“
Brown & Co., Louisville, Ky.,	1,500	“

We believe this enumeration embraces all the manufactories of sewing silk in the United States. There is, or was, a small mill at Mt. Pleasant, Ohio, for the manufacture of silk cravats and vestings, and also a small establishment operated by a German association at Economy, Pa. Our estimate above, will give an aggregate of about 75,000 lbs. of sewing silks manufactured per annum. The business is yet in its infancy—is but imperfectly organized, and never has been judiciously nor energetically pursued. If the raw stock could be admitted free of duty, or the duties more radically reduced—and we think they should be—it would give an impetus to the business, and place it beyond all contingencies of domestic misfortune or foreign competition. We hope this young and productive branch of our national industry may be represented to the consideration of Congress, and the strong arms of a protective policy extended to its aid and support. A number of the firms now in this business contemplate enlarging their establishments the present year; and we are informed that Messrs. Rixford & Butler, of Mansfield, Conn., are building machinery for a new mill to be erected in Philadelphia, and to be owned and operated by gentlemen in this vicinity. The manufacture of sewing silks and silk fabrics, is yet destined to be a great business in America

APPENDIX No. 11.

DYER'S MADDER.—(*Rubia Tinctoria.*)

QUANTITY IMPORTED—ITS CULTIVATION IN THE UNITED STATES

Successful Cultivation of Madder in Ohio.

Hon. Edmund Burke, *Comm'r Patents, Washington.*

Dear Sir—I take pleasure in complying with your request, to furnish such information as I possess in relation to the culture of dyer's madder in this state.

It will be remembered that in 1843, I furnished to your predecessor in office a communication on this subject (published with report of commissioner of patents for 1843,) giving an account of the very successful experiments of Mr. Joseph Swift, near Birmingham, Ohio, who is probably the most extensive cultivator of madder in the Union.

His first crop of which particular notice was given consisted of nine acres. It was harvested in the fall of 1842, after being allowed four seasons growth, and produced at the rate of 2000 pounds per acre on his best land. From a careful estimate of all the expenses attending the cultivation of this crop, and its preparation for market, Mr. S. furnished me the following statement of the results:

The amount of labor required, including the preparation of land, planting, cultivating, digging, cleaning, threshing, &c. was from eighty to one hundred day's work per acre, (including team work.) The outlay for buildings, fixtures, &c., did not exceed, in all, fifty dollars.

The value of the crop was at the rate of fifteen cents per pound, at which price he sold most of it, notwithstanding the circumstance of its being unknown to purchasers, and having to encounter the prejudice that usually exists in such cases.

The result, then, in figures, fairly stated, stands thus, for an acre of good land properly managed:

By 2000 pounds of madder, at 15 cents per pound,		$300 00
Contra—To 100 days' work at 75 cents per day,	$75 00	
Use of land 4 years at $4 per year	16 00	
Grinding, packing, &c	9 00	
		100 00
Leaving a nett profit per acre, of		$200 00

The *quality* of this madder was pronounced superior to most of the imported; and no difficulty was found in selling it wherever it became known. The price of madder in the western cities (and also at the east I believe,) has varied during the past five years, from 14 to 18 cents per pound; the better qualities often selling at 18 to 20 cents, at wholesale.

The *yield per acre*, Mr. S. is now convinced can be increased to 3000 lbs.; and it is better to harvest the crop at the end of three years' growth, than to allow a longer period;—these improvements will, of course, nearly double the amount of profits.

The kind of labor required in cultivating madder, can most of it be performed by a cheap class of hands, such as German immigrants; and hence the business can be most advantageously carried on where such laborers can be readily obtained whenever wanted, without having to furnish them constant employment. The vicinity of our western cities is particularly favorable on this account; and the lack of this advantage has prevented Mr. Swift from engaging in the business as largely as he would otherwise have done.

Casualties.—Madder appears to be quite as certain a crop as most others in this country. It is entirely exempt from injury by insects—and also by the weather, after the first season's growth. The plant is perfectly hardy—stands frost well, and also heat and drought—excepting that during the first winter after planting there is danger on some soils of the ground heaving by frost so as to expose the roots to the air, and cause them to winter kill, as is the case with wheat, &c. There is also danger, in this climate, of a severe drought, occurring immediately after planting, and destroying the sets before they have commenced to grow. I suffered considerable loss from both of these causes the past year, in making an experiment with madder near this city, (Columbus.) Mr. Swift, also, in the spring of 1843, lost nearly the whole of his new plantation from the effects of a severe drought just after planting. This occurrence left so few roots alive, that it was two years before he obtained a sufficient quantity of sets to renew his plantation; and this will explain why it is that he harvested no crop for four or five years until the past year, as he neglected to make any new plantation until after the first experiment was completed.

Propagation.—In this country madder produces very little if any perfect seed. In Europe seed is produced, and it has on several occasions been imported and sold to some extent in this country, but I have not heard of a single instance where it has been made to vegetate freely, if at all. In fact I am informed that in Holland and France the madder growers never depend on seed, but plant sets (pieces of roots) as is done by Mr. Swift and others in this country. This adds considerably to the expense and difficulty of commencing the business.

Directions for Cultivating Madder.

Having visited Mr. Swift on several occasions, and received from him both verbal and written instructions and observations on madder culture, and having also witnessed some experiments of other persons in this business, I will now give, as well as I am able, concise practical instructions in the art of cultivating madder, in the hope that I may thereby be instrumental of contributing in a small degree to the prosperity and independence of our beloved country, by causing one article of extensive use to be produced at home instead of imported from abroad.

Soil and preparation.—The kind of soil on which Mr. Swift and others in this state grow madder, is river bottom land; a deep rich loam with a large portion of vegetable matter; not *wet* or liable to be overflowed. From an experiment he has tried, however, Mr. Swift is of the opinion that good strong upland soil, not so clayey as to become hard in summer, is nearly or quite as suitable as bottom lands, provided it be well enriched with manure. He also thinks that soils containing *lime* will produce a better quality of madder than such as are destitute of lime; but of this he is not certain. The land should be as free as possible from grass or weeds, stones, roots, &c., and if cultivated in hoed crops for a year or two previous, all the better.

The land should be ploughed *as deep as possible* in the fall, and if clayey, be laid up in ridges so as to be mellow in spring; and as early in spring as the ground will permit, apply a good dressing of barn-yard manure—upland soil would be improved by hauling on also decomposed swamp earth or leaf-mould from the woods; the amount of enriching to be proportionate to the previous condition of the land. Then plough deep, and harrow till quite smooth, and the ground is ready for planting.

Planting.—With a single horse plough, strike small straight furrows, say three inches deep, and eight feet apart, the whole length of the field. In these furrows drop the roots, placing them lengthwise, without breaking, leaving about one foot space between the roots, then cover with hoes, about two inches in depth. About ten bushels of sets are required for an acre.

After culture.—As soon as the plants make their appearance, go over the ground between the rows with a cultivator, and with hoes along the rows, carefully, so as to destroy all the weeds without injuring the plants. Repeat the cultivating and hoeing as often as weeds make their appearance, as it will save much labor the second year if the ground is kept clean the first.

If any vacancies appear in the rows, by the roots failing to grow, take up portions of the strongest roots and transplant to fill up; this should be done in May or June, when the plants have become well rooted.

As soon as the plants are twelve or fifteen inches high, the tops are to be bent down on to the surface of the ground, and all except the tip end covered with earth shoveled from the middle of the vacant spaces; bend the shoots outward in both directions, so as in time to fill the vacant space except an alley about two feet wide. After the first time covering, repeat the weeding when necessary, and run a cultivator or single horse plough through the alleys several times, to keep the earth clean and mellow. As soon as the plants again become twelve or fifteen inches high, bend down and cover them as before; repeat the operation as often as necessary, which is commonly three times the first season; the last time may be as late as September, or later if no frosts occur. By covering the tops in this manner, they change to roots, and the design is to fill the ground as full of roots as possible. When the vacant space is full, there will be little chance for weeds to grow; but all that appear must be pulled out.

The second year.—Keep the plants free from weeds; plough the alleys and cover the tops as before directed, two or three times during the season. The alleys will now begin to form deep and narrow ditches, and if it becomes difficult to obtain good earth for covering the tops, that operation may be omitted after the second time this season. Care should be taken when covering the tops to keep the outer edges of the beds as high as the middle; otherwise the water from heavy showers will run off, and the crop suffer from drought.

The third year.—Very little labor or attention is required, until digging time. The plants will now cover the whole ground. If any weeds are seen, they must be pulled out; otherwise, their roots will cause trouble when harvesting the madder. The crop if well attended and on suitable soil, will be fit to dig at the end of the third year; but if otherwise it will pay better to be allowed four seasons' growth.

Digging and harvesting.—This should be done between the 20th of August and the 20th of September, or before bad weather is to be apprehended.

Take a sharp shovel, and cut off and remove the tops within half an inch of the surface of the earth; then take a plough of the largest size, with a sharp coulter, and a double team, and plough the bed beam deep, turning the furrows outwards; remove this earth with forks or shovels, as deep as ploughed; on to the ploughed ground adjoining, stirring it well with forks, and picking out all the roots; then plough the bed again, beam deep, (if the roots have descended as far,) and stir the earth with forks, as ploughed, to get out all the roots.

Washing and drying.—As soon as possible after digging, take the roots to some running stream to be washed. If there is no running stream convenient, it can be done at a pump. Take large round sieves, (riddles,) two and a half or three feet in diameter, with the wire about as fine as wheat sieves; or what is better, procure from a hardware store sufficient screw wire of the right fineness, and make frames or boxes about three feet long, one foot deep, and the width of the wire; on the bottom of which nail the wire. In these sieves or boxes put about half a bushel of roots at a time, and stir them well in the water, pulling the bunches apart, so as to wash them clean; then, having a platform at hand, lay them on it to drain. A couple of hands will wash, in this way, 125 to 150 bushels per day, in a convenient stream of running water.

Next, have a sufficient number of platforms made of common light boards, with cleets nailed across the under side, putting two or three boards together, so as to make them about four feet wide, and twelve or fourteen feet long: on these the roots are to be dried in the sun as follows: Take the roots to a convenient place, not far from the house, then spread them on the platforms about three or four inches thick; place the platforms side by side, in rows east and west, and with their ends north and south, leaving room to walk between the rows. Elevate the north ends of the platforms about eighteen inches, and the south ends about six inches from the ground, putting poles or sticks to support them; this will greatly facilitate drying. After the second or third day drying, the madder must be protected from the dews at night, and from rain, by placing the platforms one upon another, to a covenient height, and covering the uppermost one with boards. Spread them out again in the morning, or as soon as danger is over. Five or six days of ordinary fine weather will dry the madder sufficiently, when it may be put away in a barn or other dry place, till it is convenient to kiln-dry and grind it, which may be done at any time during fall or winter, when there is prospect of fine weather. In damp weather the roots will absorb moisture from the atmosphere, while breaking and hauling to mill, so as to render it difficult to grind.

Kiln-drying.—The size and mode of constructing the kiln may be varied to suit circumstances. The following is a very cheap plan, and sufficient to dry one ton of roots at a time. Place four strong posts into the ground, twelve feet apart one way, and eighteen the other; the front two fourteen feet high, and the other eighteen; put girths across the bottom, middle and top, and nail boards perpendicularly on the outside, as for a common barn. The boards must be well seasoned, and all cracks or holes should be plastered or otherwise stopped up. Make a shed roof of common boards; in the inside put upright standards about five feet apart, with cross-pieces to support the scaffolding; the first cross-pieces to be four feet from the floor, the next two feet higher, and so on to the top. On these cross-pieces lay small poles, about six feet long and two inches thick, four or five inches apart. On these scaffolds the madder is to be spread eight or nine inches thick. A floor is laid at the bottom, to keep all dry and clean. When the kiln is filled, take six or eight small kettles or hand furnaces, and place them four or five feet apart on the floor, (first securing it from fire with bricks or stones,) and make fires in them with charcoal, being careful not to make any of the fires so large as to scorch the madder over them. A person must be in constant attendance, to watch and replenish the fires; (but he should be cautioned not to remain long inside, as the gas from charcoal fires is liable to cause suffocation.)

The foregoing is Mr. Swift's mode of drying. He says, the heat from the small fires will ascend through the whole kiln, and dry the madder completely in ten or twelve hours. When sufficiently dried, the roots will be so brittle as to break like pipe-stems. It is probable that a good *box stove*, placed in the kiln, with a pipe passing up through the middle, and well supplied with hard wood fuel, would answer the purpose as well as the charcoal furnaces or kettles, while it would cause less risk from fire, and no danger to life or health.

Breaking and grinding.—Immediately after kiln-drying, the madder must be broken by threshing with flails, or passing through a bark mill or some other machine for the purpose, so as that it will feed in the stones of a common grist mill. The breaking and grinding must be done immediately after the kiln-drying, (say the next day, after drying during the night,) else the roots will gather dampness from the atmosphere sufficient to prevent grinding. But if broken and taken to the mill immediately after drying, and during fine weather, there will be no difficulty in grinding the madder in any grist mill.

When ground, it should be packed in barrels like flour; then it is ready for market.

Additional remarks.—In a letter from Mr. Swift, received a few weeks since, he informs me that on a portion of his land the crop of madder harvested by him this fall, produced at the rate of 4,000 pounds per acre; but owing to injury done by the freshet last spring, and by winter-killing, the average per acre was not over 2,000 pounds. He does not intend to plant over three or four acres in any one year hereafter, owing to the difficulty in his neighborhood of procuring extra laborers at times when they are needed. Mr. S. offers to furnish roots for planting, to any person who may desire to engage in the business of cultivating madder; price $1 50 per bushel, when twenty-five bushels or over are taken, with no extra charge for casks or delivery at the port on Lake Erie. The best time for transporting them is in the fall; but early in spring will answer. Address Joseph Swift, Birmingham, Erie Co., Ohio.

Messrs. Bateham & Eaton, at this place, (Columbus,) have three or four acres of madder, now two years old, and they intend to plant as much more the coming spring. They also offer to furnish roots to any who may desire them, on the same terms as above stated. They can be sent by canal and Ohio river very early in the spring, to any place south or south-west.

M. B. BATEHAM,
Ed. O. Cultivator.

COLUMBUS, O., *Jan'y*, 1848.

Statement of the quantity and value of Madder imported into Boston, Philadelphia and Baltimore, from the 1st *January,* 1845, *to the* 30*th September,* 1847, *and into New York, from* 1st *January,* 1845, *to the* 30*th June,* 1847; *prepared from returns by the Collectors of those Districts.*

From whence imported.	Quantity.	Value.
France on the Mediterranean,...........	8,098,200 lbs.	$831,071
Holland,..............................	5,961,950 "	490,864
England,..............................	1,785,387 "	201,921
Belgium,..............................	481,392 "	47,381
Sicily,...............................	257,786 "	26,746
Turkey, 201 bales, estimated at,..........	200,000 "	22,034
Spanish Atlantic ports, 21 bags, estimated at,	20,000 "	398
	16,804,715 lbs.	$1,620,415

The Collector at New York could not, from the great pressure of business in his office, extend his return further than to the 30th June, 1847.

DANIEL GRAHAM, *Register.*

Treasury Department,
Register's Office, Oct. 20, 1847.

APPENDIX No. 12.

ON THE CULTURE OF THE GRAPE, AND THE MANUFACTURE OF WINE.

CINCINNATI, Dec. 3, 1847.

Sir:—Agreeably to your request, I shall devote this evening in giving you a hasty description of the cultivation of the grape in this vicinity, and the manufacture of wine. It is some fifty years since the attempt was made at Spring Hill, in the vicinity of Philadelphia, I believe by a society of gentlemen, under the superintendence of a foreign wine cooper. Foreign grapes were tried, and, as usual, without success. One grape only was found to suit the climate, and was the grape now known by the name of the Schuylkill muscadell, or Vevay grape. It is a native grape of Pennsylvania, and was first found on the banks of the Schuylkill river. To give the wine made from this grape reputation, it was called the Cape grape, and was said to have been obtained at the Cape of Good Hope. The undertaking proved a failure; and the next attempt was by the Swiss emigrants, at Vevay, Indiana, on the Ohio river, seventy-five miles below this city. They imported the best wine grapes of Switzerland, but found them unsuited to our climate, and hearing of the Cape grape at Spring Hill, obtained plants, and for many years cultivated this grape extensively. It is a coarse grape, but an abundant bearer, and perfectly hardy, and less subject to rot than any other grape we cultivate. From it a rough, red, hard wine was made, in consequence of their pursuing the Swiss custom of fermenting in the skins. But little wine was imported to the back woods in that day, and it met a ready sale. In a few years the importation of foreign wines increased, and our Buck-eyes and Hoosiers became proud, and the wines of Vevay became unsaleable, and were chiefly used for making of sangaree, for the manufacture of which it was preferred to any other. The cultivation languished, and I have not, for many years, heard of any of the wine being for sale. About the time they began to decline the cultivation I commenced it, believing a good wine could be made from the same grape, by a different process of manufacture. I put a German vine dresser on a hill, on Bold Face creek, about one mile and a half from the river, and four miles from the city. I planted, in the first instance, the Vevay grape only, gathered the grapes as soon as ripe, put them on the press as soon as gathered; and from them made a wine of the color of Madeira, and resembling Madeira of the second quality. I added from ten to sixteen ounces of sugar to the gallon of must, and, after fermentation, brandy, as is customary with Madeira. I soon after obtained the Catawba grape, and some other native grapes, from Major Adlum of Washington City. The Catawba was the only one of them I found worthy of cultivation; and of this grape I formed, and still entertain, a high opinion, as a wine grape. In a letter to me, Major Adlum says: "I found this grape in the garden of a German near Washington. Of its origin I know nothing. In introducing this grape to public notice, I have done my country a greater service than I should have done, had I paid the national debt." I entirely concur in this opinion. Most grapes do not impart their aroma to the wine, but a new one is formed by fermentation, which leads foreign wine merchants to flavor their wines. The wine from the Catawba grape retains the aroma and muscadine flavor, in all its stages. Our Germans, in the first instance, objected to this peculiar flavor; but all now unite in giving the wine from this grape a preference over the German wines. Major Adlum erred in making from this grape a sweet wine, by the addition of much sugar to the must. I saw his error, and for some years put from six to ten ounces of sugar only to the gallon of must, and the wine was suited to our palates; for at that period, we had not been accustomed to the celebrated dry Hock wines, and should have pronounced them hard cider. Our German emigrants learned us better, and we now seldom add sugar to the must; but I would still recommend it, in seasons when the grape ripens badly. When added before fermentation, I do not believe it can be distinguished from the saccharine principle in the grape. Brandy would be highly injurious to this wine, and I have never had it run into the acetous fermentation or become ropy, which is often the case with the light wines of Europe.

I believe the Catawba will make a superior Champaigne wine. Custom has made us partial to the skin flavor, common to some imported wines which they obtain from the fœtid goat skins, in which the wine is brought from the mountains; and to the bilge water taste and aroma of the Spanish manrinvella. Custom will soon reconcile us to the rich and pleasant muscadine aroma of the Catawba wine. We shall soon be prepared to send specimens of our western wines to your eastern cities. But candor compels me to say, that I shall dread the accurate palates of your eastern wine bibbers. A gentleman from one of your cities, a few evenings since, very gravely and sincerely, gave me an instance which took place in his own presence. Their wine club had recently broached a pipe of high priced wine, with which they were much delighted, till a conspicuous member observed, that he detected a slight copper taste. A brother member admitted a slight peculiar flavor, but insisted it was from leather. The president of the society was referred to, who promptly decided it was a compound of both copper and leather. The debate waxed warm, and all three had their adherents; when it was decided to draw off the wine from the pipe in the presence of the society. This was done, and at the bottom, immersed in the sediment, was found a small copper key, with a short strip of leather attached.* In Europe we are told the quality of the wine depends but little on the variety of grape used, but on the soil and exposure. Certain it is, the wine of one vineyard, separated from its neighbor by a path, will command five times the price of the wine from the neighboring vineyard. The consequence is, that the one is sold as soon as it comes from the press, whilst the other is kept for years, when it is bottled, and meets a ready sale, at a high price. This difference is in part explained by their old adage, that "a poor man cannot make good wine." A poor man cannot give it necessary attention; cannot afford a proper cellar, or to keep it to a proper age. It is also notorious, that some celebrated vineyards in the hands of new occupants, have lost their high character. Whilst others, after years of patient exertion, have brought the quality of their wines to the first class and highest price. Where the character of a vineyard is established, in a bad season, the wine is sent to the city and sold without the owner's name. The great difference exists in the neatness, skill, and care used in fermentation. What so simple as the making of butter, yet how few make it of the first quality.

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* I presume the Philadelphia gentleman took it for granted that Don Quixote never got as far west as our backwoods.

It is now twenty-five years, since I made my first wine, yet it was not till the present season, that I was fully aware of the great importance of care in the selection of the fruit; quick pressing, clean casks, &c. &c.

The wine of some of my tenants I have for years considered of double the value of the wine of other tenants, and was under the impression that the wine of some of them could not be surpassed. But I was at the vineyard of my tenant, Mr. Schneike, in the Garden of Eden, recently, and it is about seven weeks since he made his first wine. He made but two barrels, one of which he sold, the other was retained for me. It was made from the Catawba grape, was as clear as amber, and superior to any I have seen. I showed a sample of it to Mr. Yeatman, who has a large vineyard on a high hill, fully exposed to the south, and under the charge of an experienced vine dresser, and the last fall had a fine vintage. But his first enquiry was, has Mr. Schneike any of this wine for sale? I remarked, I regretted to say, he had sold his cask, or I should have bought it at an advanced price. I regret to add, that the purchaser found the wine in such demand, that when the cask was half emptied, he filled it up with cider. This practice will soon injure the character of our domestic wines. About fifteen years since I commenced importing foreign wine grape vines, and went to great expense in preparing ground for them at Tusculum. I imported several thousand roots from Madeira, and as many from Germany, and from the vicinity of Paris, Bordeaux, and from Burgundy. They all lived, but were not suited to our climate, and were rooted from the vineyards. My last trial, was five thousand plants from the mountains of Jura, in France, where the vine region suddenly ends; supposing the vines from that northern latitude would be more congenial to our climate. There were twenty-two varieties. They all lived, but after a trial of five years, were all discarded. We must rely on our native grapes, and new varieties from their seed, or a cross between our natives and the best wine grapes of Europe.

In raising seedlings from our Catawba grape, I discover a disposition to go back to the parent fox grape. We have raised from the seed of this grape, white varieties, but none of them equal to the parent. That the Catawba is a native grape, I have no doubt. I have obtained vines producing fruit of similar color, aroma and flavor, from the woods in other states. The fruit is rather smaller; the plants of less thrifty growth, and not so abundant bearers. Mina's seedling, is clearly from the fox grape. It is of the color and size of the Catawba, much sweeter, a stronger growing plant, with more of the fox character in the leaf and stem, and by some persons deemed a better table grape. I have seen it one season only. But I deem it inferior, and judging from this season, a less abundant bearer. I thought it had less of the aroma of the fox grape than the Catawba, and was anxious to test its quality for wine, believing it might be valuable for that purpose. I made a bottle of it. It is not yet perfectly clear. The must was rich in the saccharine principle, but from present appearances, the fox aroma and flavor is too predominant, and not of the most favorable character. I have of late years endeavored to obtain native grapes from all parts of the United States, but have found but few valuable for the table, or for wine.

The Herbemont and Missouri, I consider the best for wine, and both are good table grapes, and free from the hard pulp common to most American grapes. The Herbemont for the table, is equal to most foreign grapes, and makes a fine wine, and generally has more or less of the aroma and flavor of the Manrinvella. I regret to say, that both are subject to rot—particularly the Herbemont. The Missouri makes a wine resembling Madeira. Lord Morpeth when here, drank it in comparison with a fine Madeira, not knowing it to be a domestic wine, and gave it the preference. I know not whether he is as good a judge of wine, as he is of diplomacy. The Ohio, I believe to be a native, and may be the same as the jack grape of the Mississippi. It was sent me by an unknown person, 17 years since. It is equal as a table grape to the Herbemont, and perfectly hardy, though it does not succeed as well at the vineyards, as in the city. The bunches often reach 10 inches in length. A few long shoots should be left, and fully exposed to sun and air, by not having the shoots crowded together. The Lenoir greatly resembles the Herbemont, and is by many deemed the same grape. It is not, nor is it equal as a wine grape. The wood is of a light color, and of a blue tinge, and a more vigorous grower, and the leaves at the extremity of the shoots, of a green color. The bunches generally have the grapes more compact. The Herbemont has a dark red wood, and the leaves at the extremity of a brown or red color. We need not seriously regret that foreign table grapes will not succeed in our climate, if we can raise the Herbemont, Ohio, Lenoir, Elsinborough, and Catawba grapes. The Norton's Virginia seedling does not deserve the reputation it has had, either as a wine or table grape. With care and skill in the manufacture, the pure juice of the Catawba grape yields a dry wine, equal to the best Hock, and of superior aroma and flavor. Five years since, I made some Champaigne wine from the Catawba grape, that was by competent judges pronounced the best they had ever drank. My success, was the effect of chance, without skill, and I could not succeed in my second attempt. But it induced me to erect a building for the manufacture of Champaigne, and to send to Champaigne in France, for a skilful wine cooper. I succeeded in obtaining one two years since, but he was drowned in the Ohio a few days after his arrival. I now have a second manufacturer, who learnt the manufacture in Champaigne, and was for the few past years employed in the resuscitating imported Champaignes in the city of New York. He commenced the manufacture last spring, but as he deems his wine unfit for us, till it has been a year in the bottle it will not be ready for use till next spring. The skill of my wine cooper is therefore yet to be proved. If he fails, I shall obtain a new manufacturer, and if I fail on a second trial to equal the best imported, shall abandon the experiment. I have full confidence of success. But I rely on making better wines in future, by greater care in manufacture.

From the same grape, of a red or dark color, four kinds of wine may be made, by a different process of manufacture; and even five. By pressing as soon as gathered, a white wine is made, of the color of Madeira, or Hock. By the addition of much sugar to the must, a sweet wine. By adding no sugar, a dry wine. By a small portion of sugar to the must, a wine between the two. The coloring matter is in the skin. By fermenting on the skins, a red wine is made, and by the same process in adding sugar, wines of the character of the white. Where sugar is added, it should always be to the must as it comes from the press, not the wine after fermentation.

Many have been under the impression, that to make wine of the first quality, it must be made in large quantities. I have not so found it. I have made wine of a good quality, in a Champaigne bottle, and would recommend persons in this manner to test the quality of all new grapes for wine, before raising them extensively for that purpose. The quality of a grape for the table, is no evidence of its value for wine. Hughes' crab apple is scarcely superior to the wild crab for the table, yet it has no rival as a cider fruit. I would not be understood as saying, that a soil that retains moisture, is favorable to the cultivation of the grape. But from my experience, I should prefer a rich soil, from 12 to 18 inches deep, with a clay subsoil, to a light soil; mixed with gravel, and gravel below it. I have wine from the Catawba grape, made without sugar or spirit, that is 19 years of age, and has improved greatly. At the New York Institute, it was said, that before shipping Port wine from Spain, 33 per cent. of brandy was added to the wine. Port wine is one of the strongest of wines, yet I have never seen one that had been strengthened by the addition of half that quantity. Although I do not consider the grape one of our most certain crops. I believe it is as productive here as in Europe. They are there satisfied, if they can have an abundant crop of fine fruit, one season in four. The Institute speak of it, as the most certain of all crops.

I cannot concur in all the other views expressed in their late publication. The Scuppernong grape I do not consider "valuable for the table or for wine, nor that it is a chance seedling from a stranded ship on the sea shore in North Carolina." It abounds in all directions on the waters of the Mississippi, and is there called the muscadine. The growth, wood, size and appearance of the leaf, are so peculiar that it cannot be mistaken. There is a white and black variety. The white is the better fruit, and is not often met with. The bunches rarely contain more than from one to four berries. The skin is thick and the pulp hard, but the juice sweet and aromatic. The vines will not bear pruning, and cover a large extent of ground. In North Carolina it continues to ripen for several weeks, and as fast as they ripen they are shaken from the vines as you would apples or pears. It is only calculated to make a sweet wine by the addition of much sugar. It will not stand our winters. They stated two thousand gallons had been made from an acre. Mr. Herbemont professed to have made at the rate of three thousand five hundred gallons to the acre from his Madeira grape. During the past twenty years, we have had many fine crops of grapes, and bunches of the Catawba have, in our vineyards, weighed twenty-four ounces—yet I have never known an acre to yield over eight hundred gallons, and such a crop is, like angels' visits, "few and far between." Nor have we found the grape of late years "a certain crop." We do not find "a light sandy soil the best," but a good soil, with a subsoil of clay, and our vineyards are raised almost exclusively from cuttings. We plant two in the hill, joined at the top and separated at the bottom, and generally have spare plants the next season, and the one can be removed without interfering with the roots of the other. Our native grapes are not averse to water, as our fox grapes are found in great abundance on our bottom lands, on the banks of small streams, where the ground is nearly on a level with the water. We never water our cuttings.

On level land, I should leave from five to six feet between the rows, and a space of four and a half feet between the plants. On the sides of hills I should generally place the rows from four to four and a half feet apart, and leave from three to four feet between the plants. Plants of vigorous growth should have more room than those of delicate growth. We use stakes only. The first season we usually let but one shoot grow. We cut this down to two or three eyes the next season, and break off all but the strongest shoot, when a few inches long. The next season we cut down to three or four eyes, and let two grow, and the season following, cut one of them down to four or five eyes to make new shoots, and leave the other from three to six feet long, according to the vigor and growth of the plant, to bear fruit—each year thereafter cutting out the old wood that bore the fruit, and leaving wood of the preceding year's growth to bear the fruit, and heading others down to four or five eyes to make new wood, and never letting more shoots grow than we want the next season for bearing wood, or to produce new. I wish to be distinctly understood. I do not say that the wines now to be found in our coffee-houses or private cellars, will compare with the best imported wines. We have much yet to learn, and when we have acquired all the knowledge wanted, the result will be as it is in France and Germany.

The great body of wines raised in those countries, are of inferior quality, and are sold as cheap as cider. Great care, neatness and skill will be necessary to produce the best wines, both in gathering the grapes, pressing out the juice, and still more in the fermentation and constant attention to it for years after, till ready for sale. Some seasons, even a north exposure will produce the finest of fruit, and the quality of the fruit will, to a considerable extent, depend on the soil and its cultivation. In a cold or wet seasons, the grapes to the south will be the richest. In a hot and moist one, they will be subject to injury. The wine of the most careful and skilful, when their reputation is established, will command double the sum that the wine will at an adjoining vineyard, even in a season when it is of equal quality. There is much in a name.

The opinion was expressed at the American Institute, that our native grapes are yearly improving by cultivation. That "the Isabella has greatly improved in past years, and will continue to improve for the next fifty years." There is a great improvement in a native grape brought from the woods, the first year of its bearing, when pruned, and fully exposed to the sun and air. We have cultivated the Isabella and Catawba grapes for a long period, but I have seen no change in the quality of the fruit from cultivation. As our woods are cleared up, our climate undergoes a change, which improves certain fruits, whilst it injures others. And the change in our soil from cultivation, also operates on our fruits. The finest of all pears, the yellow Berne, begins to fail with us. Our peach crop is a very uncertain one, to what it was thirty years since. Dr. Underhill is correct in saying, that "Mr. Adlum failed to make good wine." One cause for this failure, I have stated; the addition of too much sugar. Dry Hock wine was not then, and is not now much drank at Washington. I applied there for Hock bottles, and was told Hock wine was not common. Champaigne bottles were plenty. Another cause of Major Adlum's failure, was his poverty. I was at his vineyard one season when his vineyard failed, and he was supplying the deficiency from the wild grapes from the surrounding woods. Dr. Underhill states, that the "bleeding of the vine is injurious in France, but not in Germany or the United States." This is certainly an error. All our German vine dressers endeavor to avoid it. It is evidently injurious to all vines, but less so in the United States, than in most parts of Europe, as our vines grow more vigorous, and overcome it. He speaks of the "York Madeira, as a small grape, and fine for the table and for wine." The grape I saw at Little York as their Madeira, I thought inferior as a table grape, and their wine was certainly of inferior quality. I had not then much knowledge of grapes, but I suppose it to be, what Mr. Downing represents it, the Alexander or Schuylkill Muscadell. Till advised of the contrary, I supposed the grape in South Carolina contained more sugar than in this latitude. Both Herbemont and McCall used more than double the quantity of sugar we used here, yet they often had their wines run into acetous fermentation. I am certain such was the case with the wine of Mr. Herbemont. Messrs. Herbemont, McCall and Guignard, all cultivated the grape for wine, and were men of intelligence and experience. It is probable the latter gentleman is still engaged in the cultivation.

In a letter from Mr. Guignard, of Columbia, South Carolina, written in September, 1846, he says, "I have succeeded, far above my expectations, in Virginia, the grape having made, in 1844, 2,000 gallons; in 1846, 2,200, and last month, 3,200 gallons, from about five acres. I have not, however, succeeded in making wine. I usually make 1 or 200 gallons of *good* wine, which I must consider by *accident*, for the far greater portion becomes acid in the course of the spring, after vintage; and which I have not been able to counteract. I followed Mr. Herbemont's plan, of adding sugar, at the rate of a half pound to one pound per gallon, and purpose adding brandy, when I rack my new wine, which I generally do at the commencement of winter." I take it for granted, his sugar is added to the must. If, after fermentation, a renewal of it the next spring, would follow as a matter of course. I incline to the opinion, that the saccharine principle in the grape, at the south, is as great, if not greater, than with us; and that the leaven is in proportion. Their summers are shorter than ours, and they have not the advantage of our cool cellars. If he were to add more sugar than the leaven can convert into alcohol, the wine would not run into the acetous fermentation, but the result would be a rich sweet wine. Does not this result, in Carolina, account for the quantity of alcohol that is found in the wines of Madeira? Is not the brandy added to prevent a renewal of the fermentation? They have a method, as I was informed by the late Mr. Payne, a wine merchant of Madeira, of adding, both strength and richness to their wines, at the same time. To the must of the Malmsey grape, they add, as it comes from the press, 33 per cent. of brandy. This checks all fermentation, and it is added to their wines. Age is given to their wines, in Madeira, by keeping them for some months in a cellar artificially heated. We hear much of the South Hill Madeira; and the wine from the south side of the island is not, by law, allowed to enter their harbors. I sent to Mr. Payne for a person who had been bred to the grape culture and manufacture of wine in Madeira: he is now in our city. He tells me that his father lived on the sea shore, five miles from the seaport, Funchal, and that he has toiled many a dark night, unloading wine from the north side of the island, and conveying it to the cellar of his father, who was the proprietor of a vineyard. The wine lay in his father's cellar till the spring, when it was, with their own wine, carried to a merchant in Funchal. I know that whiskey was taken to Madeira, by a wine merchant, as cheaper than brandy, believing he could take from it its peculiar flavor and use it in giving strength to their wines. I would strongly urge the grape culturists, at the south, to add brandy to their wine after fermentation, to prevent its renewal in the spring; but not rectified whiskey. Brandy made from the same grape would have the same flavor and generally be preferable to French brandy. I would also recommend them to give it both strength and richness, by adding one-third brandy to must, as is done in Madeira, and mix it with their wine. This accounts for some of the wines of Madeira being less dry than others. They also add to it a portion of sweet Malmsey, to produce the same effect. Mr. Payne sent me some samples of sweet Malmsey from Madeira, which I thought a less pleasant wine than our Isabella, where one and a half or one and three-fourth lbs. of good loaf sugar was added to a gallon of the must.

The Missouri grape, I obtained from the elder prince, twenty-five years since, and it was represented to be a native grape. Its origin is unknown. The Herbemont, Madeira and Lenoir, were both supposed by Messrs. McCall and Herbemont, to be natives of South Carolina, from the great resemblance in the wood to their native vines. But they yielded up this opinion, from assurances that the same grapes had been recently imported from France. I still incline to the opinion, that they are native grapes, from their hardy character. If foreign grapes, it would be singular, that among our great variety of foreign vines imported we should not have found one equally hardy and productive. The Bland grape is of good quality for the table, but did not with me make a good wine. It ripens late and does not succeed in this latitude. It is, by many, said to be a native; I doubt it. Gen. Harrison assured me that it was imported into Virginia at a very early day by a Frenchman of the name of Mazzei.

The quantity of must from the grape, is I believe as large with us, as it is in Madeira or in Europe. With them four gallons is the usual yield from a bushel of good grapes. The yield with us is the same from the Catawba. In the fall of 1845, our grapes were unusually fine and some of my tenants assured me they had five gallons from a bushel and where half of the grapes were separated from the stems six bushels. In these cases, it is prudent to make some allowance for lee-way. In many parts of Europe they cut off the tops of the new wood, intended to bear the fruit the following season, during the summer; the better to ripen the wood. With us it is a dangerous practice, as it is calculated to force out the fruit buds of the next season The lateral branches are broken off in Europe soon after they make their appearance for the same object. We should not do it till the eyes are sufficiently ripened, not to be forced out, and never break off above the point we shall prune them to. In Europe, the leaves are often thinned out, to let in the sun and aid in ripening the fruit. This we never do in our vineyards, with our hot sun we usually have no shade to spare, and to cut off leaves and branches often stops the flow of the sap, and stops the ripening of the fruit. I have no confidence in the doctrine of the acclimation of plants and that foreign vines will after a few years of culture succeed in our climate. I have, too, plants of the white sweet water in my garden and have had this variety in cultivation for 30 years. I could when I first procured it occasionally get a partial crop, for the last 15 years it has scarcely ripened a single cluster. I would recommend to landlords to rent from 15 to 20 acres to German emigrants on shares, requiring them to plant two-thirds of it in vineyard and orchard; the proceeds of both to be equally divided and the remaining one-third for the tenant to raise articles for the use of his family and in this third the landlord to have no interest, the landlord to furnish the dwelling house, wine press, fruit trees and grape cuttings at his own expense; and I would recommend to German emigrants to buy our steep river hills, for the same object, where too steep for other cultivation and of little value. An industrious German family will from their own labor and at idle seasons of the year, expend labor on them to twenty times the cost of the land, and make it more profitable than our richest bottoms. Near our city, within the last 5 years, I have seen steep hills apparently a bed of stone and not worth one dollar for cultivation, trenched 3 feet deep. The stone as far as necessary used for walls in benching the ground and the extra ones sold, and the whole converted into a beautiful vineyard, and the whole labor done at a season of the year when if not done, the family would have been idle, and to have had it done by the day at usual wages, would have cost $500 per acre. We must find a new name for Lick run a small stream near the city. The beautiful hills on both sides of it are yearly converted into vineyards and will in two or three years more afford a beautiful prospect, that the Rhine cannot equal. For the banks of the Rhine cannot boast of a soil of equal fertility.

The cultivation of the grape for wine will be profitable where persons do their own work. It is seldom that any farming pays well where there is much hiring of hands. Our German emigrants can cultivate the grape to most profit, for the greater part of the work in the vineyard is performed by their wives and daughters, without interfering with household affairs. A greater profit would accrue to a man of observation and skill, who would devote much time to the subject, be certain to have clean casks, gather his grapes at the proper moment, use great care in picking, selecting and pressing and a clean press, a cool cellar, care and skill in the fermentation, racking at the proper time, and always keeping the casks full, never to bottle it till 4 or 5 years of age, and never to sell any wine with his name, in seasons when the wine is not of the best quality. Such a manufacturer may sell his wine from $12 to 18 per dozen, when his less skilful and careful neighbor may find his wine a dull sale at 75 cents per gallon, with the same exposure and a soil equally favorable for the grape. I have never given the subject the personal attention necessary to the most perfect success. I am now too old to undertake it, and beneficial as the experiment might be, it would form no grounds should I apply to Providence to extend my life for 20 years more, for having it granted. I must leave it in younger hands.

It would be a valuable business could a skilful wine merchant be found, who would buy the wines at the press, have them brought immediately to the city to his wine cellar, which should be cool, and there personally attend to the fermentation, racking, &c., till ready to bottle for sale. It would require capital and time before the buisness would be available. The profit would be certain. The day is not distant, when this and neighboring portions of the Ohio river will rival the Rhine in the quantity and quality of its wine

Yours respectfully,
N. LONGWORTH

PROFITS OF A SCUPPERNONG VINEYARD.

Years since, or when about to commence my vineyard business, I visited a Captain Burlingham, living in an adjoining county, and who about a dozen years previous, had removed from the lower part of the state (where the Scuppernong vine is indigenous,) and had brought some vines along with him. He pointed me to his beautiful vineyard of twelve vines only, covering with canopy about a fourth of an acre, and assured me, (he was a gentleman above suspicion of other than strict veracity,) that from that canopy he had made, the past season 500 gallons of wine, besides himself and neighbors partaking abundantly of the grapes for about two months. I know of two Scuppernong vines in the lower part of this state (North

Carolina,) that each produce five barrels of wine yearly. This may appear incredible to some persons, but it is nevertheless true. And I might relate like instances in my vineyards. Mr. Herbemont, late of Columbia, South Carolina, related (see American Farmer,) an instance of his Madeira grape producing at rates of more than 2000 gallons per acre.

Some persons cannot credit the amazing productiveness of improved husbandry as to grain crops. When I once informed a neighbor that twenty barrels or one hundred bushels and upwards of corn had been made per acre, he declared it to be impossible for so much to stand upon an acre at once. So that $1500 clear can be made from Scuppernong vines annually per acre, may appear utterly incredible to some persons, but it may appear still more astonishing if I assert, that it is possible to make four times that sum according to my calculation. For last winter I sold at Raleigh, to best judges of wines the Scuppernong, from one to four dollars per gallon, according to quality. For instance: my Scuppernong Madeira, a white wine made with double refined sugar, at $3 00 per gallon; and my Scuppernong Hock, a red wine at $4 00 per gallon. Now, 2000 gallons at $4 00 per gallon is $8000; and say $2000 for incidental expenses, or all the cost of making, and we have $6000 left as clear gain. For cost of making, $2000 is pretty high; but for Scuppernong Hock, I put in the juice three pounds of double refined sugar per gallon, and take extra pains to make it. Now the sugar at fifty cents per gallon is $1000. And I think another $1000 will cover the cost of other incidental expenses of making. True, the above enormous profits of $6000 per acre annually is theory as to a large scale, or even as large as one acre, as far as I know, but *equally true* that the theory is *predicated* on *facts* as to a *small* sale. And here again the purport of the maxim; as what *has been done* on *a small scale in* agriculture, *may be done* on *a large one.*

SIDNEY WELLER.

Brinkleyville, Halifax Co., North Carolina.

APPENDIX No. 13

DR. BARRET ON THE GOOSEBERRY.

From the Cleveland Herald.

The following article from the pen of J. Barret, M. D. of Middletown, Ct., deserves the attention of our horticulturists. It is well known, that the gooseberry seldom produces fine and healthy fruit in the western country. His plan is easily tested.

On the Cultivation of the Gooseberry to secure it from the Scab.

That useful and valuable fruit, the gooseberry, which is now considered so important in Europe, is with difficulty raised here, the berry so soon becomes scabbed or covered with a dirty fungus. This takes place too in gardens where every care has been bestowed on them. This excess of attention in keeping them free of weeds and grass, and exposing them to the hot weather of August and September, proves highly injurious and contrary to their nature.

I am fully convinced, after much observation that the mode of culture with gooseberries in England will not apply to this region. I have had ample opportunities of witnessing what has been accomplished in England, and what has been attempted here, and now see the cause of failure.

In the notes I have kept on the progress of vegetation, and the ripening of fruits for 1837, which was a remarkable wet season, there is the following entry: "July 12.—The gooseberries this year are better than I have seen them for several years past. The shrubs as well as the fruit are less coated with a fungus which spoils the berries." It appears, therefore, that a wet season is peculiarly suited to the gooseberry. That the season of 1837, was remarkable for its wetness, will appear from the following table kept at Albany, N. Y. [See Report of Regents for 1838.]

1837, Rain—	April,	1	inch 63	hundredths.
	May,	7	do. 34	do.
	June,	5	do. 06	do.
	July,	4	do. 38	do.

It is satisfactory to find that a wet season which is injurious to many fruits, causing them to decay rapidly, is congenial to the gooseberry. The season of 1846, as to amount of rain has resembled that of 1837, and has suited this fruit. With this knowledge we may hope to commence a new era in the cultivation of the gooseberry, which may be highly useful in some sections.

I would here briefly state, that the secret and success in cultivating the gooseberry in this place, free of scab and securing a full crop, is to grow them in grassy places, or grass borders sufficiently wide, and allow the grass to grow rather luxuriantly among them, until they have attained their growth and are thereby secured from the forming scab.

When the berries begin to ripen, the grass should be cut, being no longer required. I saw many years ago, in Vermont, some excellent gooseberries growing in wet shady places, and among grass and plants. I also most unexpectedly found a stray gooseberry bush growing among tall rye, and bearing a full crop of excellent fruit. I give these instances to show that the gooseberry is fond of shade and moisture in this climate, and that to grow them with success in the garden, abundant dew and moisture must be provided, and this the grass fully supplies. There are two gardens within the limits of this city, which have produced gooseberries from year to year, entirely free of scab, when all others we may say generally had their fruit ruined. These I ascertained were grown rather by negligence than design, at first among the grass. One of the gardens belonged to the Rev. Dr. Jarvis, the other to Mr. John Bliss. The latter assures me, he has not failed during about twenty years in having his gooseberries free from the scab. I purposely watched these gardens attentively as well as several others, to give a faithful report of this novel mode of culture, which promises so much. I found them nearly ripe July 4. The berries were of the red kind of medium size. The bushes required the aid of props to secure them from breaking under their load of fruit. As to the quantity I was highly gratified to observe that they bore as largely as the best examples that I had seen in England.

The gooseberries in the garden of the Rev. Dr. Jarvis, grew on a long strip of grass, about four feet wide. They are not, I apprehend, the largest and choicest fruit, and at first, did not keep pace with some of the latter imported kinds. The grass instead of being cut, was suffered to grow among the bushes I was struck with the luxuriant manner they grew from the wet and dew thus afforded. While the grape and cherry were rapidly decaying, the berries of the gooseberry were entirely free of decay, being clear and bright skinned. Those in dry grounds were much diseased and the bushes had become a nuisance.

I have already adverted to the peculiarity of the blossoms of the currant, resisting heavy rains. The gooseberry blossoms are similarly constituted, and entirely different from the flowers of the grape, the apple, the peach, and the plum. I have thought that grass may be further serviceable, to the gooseberry, by abstracting from the soil those substances which foster the growth of minute fungi. This, however, is offered rather as a matter of conjecture, than from actual proof, and requires further investigation to determine.

I do not expect that the plan recommended, will be perfectly successful the first year after the removal of the gooseberry shrubs among grass or when sodded, though I do in the second season. The forming buds are injured, and the bark diseased by exposure to hot weather during the months of August and September, when they are not protected by grass and sufficiently supplied by dew and moisture. The gooseberry is a dew-loving plant, and must be supplied with moisture, otherwise it cannot flourish here as in Europe.

The wild American strawberry furnishes another striking example of a berry growing among grass. This seems its favorite place, or habitat as the botanists would say. They grow in grassy meadows in argillaceous soils, (which are best adapted to hold moisture,) much better and sweeter, than when suffocated among their own dense leaves in the garden.

I remember to have seen a garden in England devoted to the cultivation of the strawberry, where the leaves and vines became too luxuriant, and they yielded but little fruit. As an experiment, one bed was underlaid with a reddish clay, fit for brick-making, and nests or a mixture of soil was prepared for the strawberry plants. The difference was most striking; it seemed as if this bed was all fruit, and the others only leaves.

I have observed some similar examples of this preference to clay in meadows, in new cleared lands in this country, where the wood ashes and carbon of the burnt brush had given the highest perfection to the fruit, without the luxuriance of foliage which causes so much trouble. When left to nature, they travel or plant themselves, by means of the running vines they put forth.

In my botanical excursions in England, I do not recollect finding the strawberry growing in grassy places as in North America. I have turned to Gerard's famous Herbal, printed in 1597, for his experience in this matter. He says "strawberries do grow upon hills and valleies, likewise in woods and other such places that bee something shadowie."—p. 485.

The same author also describes and gives a figure of the gooseberry, p. 1143, and mentions one whose fruit "is almost as bigge as a small cherrie, and verie rounde in forme: also another of the like bignes of an inch in length. We have also in our London gardens another sort altogither without prickes, whose fruit is very small, of a perfect red colour."

This early notice shows the little progress then made in the cultivation of a fruit that is now the pride of the Lancashire weavers and not less esteemed in all the large cities of Great Britain. The English markets are now largely supplied with the gooseberry. They have grown this berry weighing 31 penny-weights and 16 grains! which is a little more than one ounce and three quarters avoirdupois. Twenty-five pennyweight is regarded as a good weight for a gooseberry.

APPENDIX No. 14.

BREEDING OF CATTLE.

*On the feeding of horned cattle, and the conditions of the most profitable use of the fodder substances.**

By T. V. Lanner, of Krumpendorf, in Carinthia.—Translated from the German by E. Goodrich Smith of the Patent Office.

For a long time past rational land-husbandry has been occupied with the promotion of the nutritive power of the different species of fodder, and more recently, relinquishing empiricism, it has been endeavored, by the progress and aid of the sciences related to it, to establish it on a more truly scientific principle, and to extend it, and in this way many advances and improvements have been made. The convention of the German farmers and foresters have deemed the object worthy of particular attention, as the programme of the former convention shows. A request relative to this subject has reached me from the officers of the 8th convention at Munich, through Prof. Dr. Hlubek, that I would communicate my experiments, which I could not, at that time, comply with, because I wished to publish them in an appropriate work, according to the request of the agricultural society of my own country.

In the mean time, I have prepared, in advance, for the honorable convention, this essay on the subject in question, in order, in this way, to contribute my mite, trifling as it may prove, to their efforts for the public welfare.

As I have pursued the fattening of oxen at large on my estate at Krumpendorf, near Klagenfurt, since the year 1822, I have compared the animals on placing them in stalls, in selling, and while fattening, have weighed them at least every month, compared the increase with the quality of fodder used, and noticed the results in these cases, so that I am in possession of many particular experiences, and in a situation to draw extensive and certain averages. These observations were undertaken merely for the purpose of serving for my own instruction, and probably but for the particular request of the agricultural society of Carinthia would have never been made public through the press, although I made statements concerning the separate divisions of the subject in the meeting of the society just mentioned, in the years 1827, 1833, 1836, 1837, 1841. Thus much for the understanding of my purpose at this time.

In a large fattening establishment, different fodder substances have been fed out; the object of such an establishment being to derive the highest possible value from the products employed, regard must therefore be paid—

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* At the general meeting of the tenth convention of German farmers and foresters, on the 19th of September, it was resolved that this essay be separately printed and distributed to all the members, and also to the various agricultural societies of Germany. This is a decisive proof of the importance and interest taken in this communication by that large and scientifically and practically educated body of men.

even if they are there produced—as well to the existing price of the same, as to their effect in the increase of the animals. This renders calculations necessary, both before and after the fattening; *before* it, in order to select the fodder substances, by which the object proposed may be obtained, in the quickest, cheapest, and most eligible manner; *after* it, in order to manage the result of the supposed production. The principle of such a continued calculation, is constituted usually of the analyses, and comparative experiments in relation to fodder, which we already possess, in great numbers, for many, and indeed almost every fodder substance.

The decided variations which are to be met with in respect to the nutritious power of many substances used for fodder, makes the preliminary choice of figures to be annexed, difficult; in a few cases, when many nutritive substances are fed out together, and copiously, the previous calculation gives the result to be expected from the same; but frequent and most remarkable differences show themselves in the effect of the fodder, when the nutritive substances, wholly alike, and even contradictory ones, present, at one time, taken with another, more or less variable increase of production. As the oxen designed for fattening were weighed by me from the placing them in the stalls, even to the time of slaughtering, every half, or at least every month—their weight and increase separately marked down, the fodder consumed by them either weighed or measured by cubic measure, and consequently no error can exert any influence on the account; the original cause of the difference of increase can be sought for only in a difference of the assimilation of the fodder employed. This determined me to enter upon a long course of experiments, and to compare the gross averages of the careful observations of many years before me, the result of which will here be given, not in detail, and step by step, but only in a summary extract limited to the present products.

Every animal, as well in a state of rest as of motion and labor, demands daily a certain portion of nourishment to live, i. e. for the reproduction of that which is lost by the process of consumption carried on by the operations of animal life, and the excess contained in the food, over and above this want, can be allowed to the animal in substance only where the nutriment contains this excess in an assimilated form.

To supply that which animals daily lose from waste by the continual formation of their solid and fluid elements, and by the process of respiration and exhalation, besides the necessary oxygen and hydrogen which air and water partially give, a certain quantity of mineral substances, and such as contain nitrogen and carbon, is needed—the last of which, as the substitute for sustaining life, must be derived by the animal according to the degree of the ordinarily existing necessity, or as increased by labor, growing, or milk production—from the nutriment.

As respects this fodder: So far as no other advantage is gained than the maintenance of the animal in the same state of its flesh and tallow, it is called *conservation*, or *sustaining* fodder. The determining of this sustaining fodder, in animals that are not worked, nor milked, and not growing, appeared to me to be first of all necessary, as the foundation of further decisions. In the year 1832 I began to determine this, and presented the results at the general conventions of the Carinthian Agricultural Society at Klagenfurt, in the years 1833 and 1835. They are the result of continued experiments, which had been already accurately supervised in former years.

According to this, the daily sustaining fodder amounts to one pound and a half of hay-value for a hundred of that live weight, which the animal had before his improvement in his state of feeding, at which he receives daily two and a half to three pounds of hay for a hundred of the live weight—or it amounts to one and two-third pounds of hay for the hundred of that live weight to which the animal is reduced after many days, by the mere allowance of conservation fodder.

Labor, milking, calf-bearing, bodily increase by growth or fattening, demand, besides this sustaining fodder, still more food corresponding to the existing necessity. If there is not enough to meet this necessity, if the animal which is not worked receives less than the conservation fodder, that which is worked less than his waste amounts to, the cow just giving milk, or with calf, and the growing young cattle less than their physical necessity demands, they become reduced, even to that live weight to which the fodder received corresponds: but at the same time also their economical use always suffers by it; the laboring ox will be incapable of severe exertion; the cow will give less milk, or bring forth a lean calf, and the poor young cattle thrive less.

In contrast to this appearance, arising from insufficient nutriment, cattle will gain more according to the degree in which the food exceeds the mere sustenance of life, and the supply of the further economical demands imposed on the animal; but in favorable progressive improvement, this will be the case only up to a certain maximum point, after which the increase of food given out will be a gain of less value on account of the diminished production obtained. While, for example; $1\frac{6}{7}$ pounds hay-value, i. e. about nineteen pounds of hay for oxen of ten hundred weight live weight, or of four hundred to four hundred and sixty pounds flesh weight, according to the measure of a scale before me, is daily given to the hundred of live weight of a fattening ox, it yields only three pounds increase of live weight for the one hundred weight of hay fed out, because the greatest portion of the fodder must be used for sustaining life, and therefore, as conservation fodder, it can furnish no increased production. But according to the scale of further average calculations, if the daily quantity of fodder be increased to three pounds of hay for one hundred weight of the live weight of the fattening ox, which, for one ox, ten hundred weight live weight, makes thirty pounds daily hay value, then the hundred of hay fed out, will give five pounds and over of increase in live weight. On the other hand, should the daily fodder be raised to over four pounds hay value for the hundred weight of live weight, which in a loose fodder and in combination agreeable to the animal can be done, so that the ox above supposed, of ten hundred weight live weight, consumes daily forty-three to forty-seven pounds hay value, the living average increase also, during a whole period of fattening, according to the scale of the increasing of fodder, would be lessened considerably below five pounds, and even reducèd to four pounds. This is of importance in a fattening establishment, because the increase of live weight, as I shall show in future results, is only a trifle less in growing animals than the increase in flesh and tallow, and every fifth hundred weight of hay is scarcely of any value. I have spoken purposely of the average results of the whole fattening time, or at least, of a long period; for in weighings repeated shortly one after another, the balances often fluctuate, for the reason that the animals, especially in the change of fodder, often eat more, and often less: though, as is always necessary, the weighing of the animal should take place at the same time of day. Besides, it must be observed, that the animals, at the beginning of fattening, give a greater gain of production of live weight and in flesh for a hundred weight of hay foddered out, than they give with the same fodder a short time before its completion, when, according to the rule, they eat less eagerly, and can only be induced, by more relishing food, to take large quantities. It is moreover self-evident, that an ox which has become much heavier by fattening, and which increase in a lesser animal may amount to about one-third of his former, or one-fourth of his present live weight attained by fattening, must have the fodder apportioned to him according to the per centage of his live weight increased in proportion to the scale of his gross weight, as it continually increases by his being fattened.

To illustrate the causes of these appearances, I will add some results:—Every animal has a normally proportioned state of corpulence and rotundity, which, according to the scale of his natural capacity for animal improvement, is based on the highest exercise of physical power, permanence and soundness, answering to that organization of his, which corresponds to his destination, according to his nature, and one while in which the animal is equally removed alike from leanness and a state of fattening. If in the otherwise perfect state of health he be below this degree, then there is an earnest effort carried on in his organism to supply the defect, to reach to his natural covering of flesh; the animal functions related to it are heightened, the appetite and the power of assimulation are increased. The more the healthy animal is found to be removed from this state of welfare, in accordance with nature, so much the greater also is the effort of nature to replace what is wanting. Whoever keeps his animals below this degree, whether they are breeding, milch kine, or young cattle, he by bad or insufficient fodder, prevents the improvement suitable to them, and stands in the way of his own profit, because, instead of giving a value to his fodder, by increase, he throws it away by the mere allowance of food for sustaining life, and which will not be repaid except as only corresponds to the reduced circumstances of the animal.

He, who by luxurious, nutritious, or frequent fodder, raises his animals above the normal state, who fattens them will make his animals more clumsy, fat, and less enduring in toil. In this case, by reason of repletion, the beneficial effort of nature for further improvement will be diminished, and the appetite, always in accordance with the necessities, will become less. In this state of repletion, the animal can only be excited by dainty food to do any thing further, and increase yet more his corpulence. The wise providence of nature, for storing up in the bodies of animals some excess for the time of need, but for refusing any superabundance injurious to health, is the reason of this appearance. According, therefore, as the supply by fodder, compared with the animal waste, presents an excess or diminution, the animal will increase or decrease. Every animal has, therefore, an individual capacity for increase which depends on his power of digestion, and the measure and quality of the substances to be consumed for food.

Every fodder substance possesses, in proportion to the nutritive power and digestibility of its composition, a less or greater capacity to cause the increase, milk production, &c. of animals. Well digesting animals, foddered with very nutritious and easily assimilated substances, in a state of rest, therefore, give the greatest and most rapid results of production, and best repay their fodder, because, together with their support of life, they, in the shortest time, consume the most productive fodder, in which, however, regard must always be had to the maximum, in the advance beyond which, the fodder often furnished too liberally, again begins to give a less increase.

The reason why fodder, when it exceeds the nutritive power, daily, of four pounds of hay value for a cwt. of a fattening animal, and especially so in the more advanced stage of fattening, gives a less productive result per cwt. of hay, than when two and a half to three pounds hay value is used per cwt. live weight, certainly consists in this, that while a very liberal supply of nutriment is furnished in larger volume, the organs of digestion cannot assimilate so much of it, as is the case when the volume is smaller. This is true, especially if the animals thereby nourished, are always in a fattened state, when the necessity of very rich nutriment is so much less as by over nutrition it has exceeded the corpulence proportioned to the well conditioned state demanded by nature, and its organism has been compelled to lay aside a part of the superfluous nutriment secreted in the form of fat, while it has expelled another portion unabsorbed as excrements.

The fact that the dung of the fattening animal affords a much stronger manure than of animals as usually fed, is a proof of this.

The period of fattening may be shortened by nutriment raised above the rule; but the value of fodder products is not always in equally favorable proportions to this ascent in the scale of nutritiousness.

On the contrary, the greater the animal waste and the weaker the power of digestion are with fodder innutritious and difficult to be digested, the more rapid is the loss. He who weighs his own cattle, sees what a rapid and striking diminution, sickness, hard labor, or new milking, the cow may undergo with bad fodder, while in the same time also, in endurance in labor and the production of milk she suffers proportionably. Young cattle foddered suitably nearly always give a proper value to their fodder. To dilate here, as to the mode of foddering suitable to young cattle, would take up too much time. I must, therefore, content myself with giving the results:

Young cattle, in a good state of health and proportional foddering, reckoned on the cwt. of their live weight, may consume more than grown up animals, and their food yields a greater productive result in live weight, for the cwt. of hay value consumed in the first of their growth, than the same fodder yields in full grown animals. They give for the cwt. of hay value consumed the first year of their age far larger increase in live weight, than the same in the first six months of the second year; and in the first six months of the second year, they again yield more production of live weight than in the second six months of the second year, as these rates of mine show.

A three year old (ein Terz) moderately well built cow which I had, by particularly excellent fodder, weighed in one year 635 pounds, two years 1015 pounds, two years nine months 1225 pounds live weight. She gained together with her calf, new born, 1160 pounds gross weight. This product for a month of the first year, amounted to 48 pounds, of the second year 31½ pounds, and of the third year only 23 pounds gross.

A calf which I raised, when slaughtered at two years and seven months old, after she had born a calf and been milked several months, yielded 490 pounds pure flesh.

To adduce dates and examples, how far the consumption and the production based on it, of particular animals, may differ from each other with like fodder, as well as many other details which would be requisite for the perfect understanding of what has been said on this subject, would be too prolix for the space and time of the present essay. Therefore, I have concluded, before the appearance of my work on this subject, to give to the public, in the *Communications of the Carinthian Agricultural Society*, as well as in the *Economical Novelties* of Professor Hlubek, a course of observations under my name, which, collectively, will treat, in an extended form and basis, of subjects only slightly touched upon in this essay.

In order to exhibit the better, and in a more comparative form, the difference of the results of foddering by a greater or smaller quantity of fodder, I will illustrate this subject by examples:

An ox, when he is entirely lean, and therefore has no tallow, as will be shown hereafter, weighs 260 pounds live weight, to 100 weight of pure flesh in the four quarters. With five per cent. of tallow, he weighs only 255 pound live weight, for the 100 weight of flesh. At ten per cent. proportion of tallow, 245 pounds. At fifteen per cent. 235 pounds. At twenty per cent. only 225 pounds gross weight, for 100 weight of flesh.

An ox of 1000 pounds live weight, weighed in a state in which he has not been fed for fattening, has when entirely lean, therefore without tallow, 385 pounds flesh, and about 9 pounds of skin and hair, in which in the after increase, the tallow consequently to be weighed by itself, is included. This ox raised to five per cent. proportion of tallow, will weigh 1050 pounds gross, 421 pounds flesh, and 21 pounds tallow. He gained, therefore, in this period of increase, 50 pounds gross, 27 pounds flesh and 12 pounds of tallow. At ten per cent. proportion of tallow in the advanced state of fattening, he weighed 1125 pounds gross, 47 pounds of flesh, and 25 pounds of tallow.

At fifteen per cent. proportion of tallow, the same ox had 1219 pounds gross weight, 519 pounds flesh, 78 pounds tallow, and therefore gained an increase of 94 pounds live weight, 60 pounds flesh, and 37 pounds of tallow, At twenty per cent. proportion of tallow, the same ox weighed 1350 pounds live weight, 600 pounds flesh, 120 pounds tallow; the increase of this period of fattening, therefore, amounted to 131 pounds gross weight, 81 pounds of flesh, 42 pounds of tallow. In the whole fattening, this ox gained 350 pounds gross, 315 pounds flesh, 111 pounds tallow.

At this collective increase he was kept on a daily foddering of 3 pounds of hay value to the 100 pounds live weight, up to five per cent. tallow, 35 days, and had 787 pounds hay value; from five up to ten per cent. proportion of tallow, forty days, with 1350 pounds of hay; from ten to fifteen per cent., tallow, fifty days, and used 1850 pounds of hay; and from fifteen to twenty per cent. of tallow sixty-five days, and used 2633 pounds of hay—all together 180 days and 66 cwt. of hay value, for the whole fattening time.

It is self-evident, that when the ox is taken with the tallow he already had, for example ten per cent. proportion of tallow, the fattening up to twenty per cent. reckoning by time, only lasted 115 days, and also would only require 4463 pounds hay value.

The same entirely lean ox of 1000 pounds live weight, which as shown at the foddering of 3 pounds hay value daily, to 100 weight of his live weight, will be fat in 180 days; with 66 cwt. of hay value, would demand in 160 days continued on, above 80 cwt. of hay value for fattening, if he received, as fodder, only 4½ pounds hay value for 100 pounds live weight.

PART II.—*On the Value of Fodder Substances.*

In this second part, I propose to speak somewhat respecting the *value* of fodder-stuffs in reference to their nutritiousness. The substances used for the food of horned cattle, belong collectively to the vegetable kingdom. We see plants formed out of the earth, water and air, through the influence of the power of life, by means of their processes of absorption, digestion, and respiration, and bringing forth the most manifold forms, and the most varied products, in a manner hitherto unsearchable, of which we, indeed, apprehend the outward appearances, perceptible to our senses and understand how to arrange them by rule and system, but the inner being of which can never be cleared up to the mind of man; as it requires the exercise of power lying beyond his faculty of conception.

Notwithstanding their diversity of form and product, all plants possess three elements, viz: carbon, hydrogen and oxygen. Many of them, and indeed, the usual fodder-stuffs of our cattle, contain more or less nitrogen, together with other mineral and earthy constituents, which must be taken, more or less into consideration, in the food of animals. These first principles, are the forming elements of which the proximate constituents of the vegetable organic being are composed. To these proximate constituents belong, among others, the so called nutritious substances of plants, in which we include in a more limited sense, the gluten of the cereals, or that of the pod fruits; the fecula, the vegetable albumen, the fatty oil, sugar, farina, vegetable gum and slime, and partially also, the vegetable farinaceous fibres that are capable of being assimilated; but in a wider sense, we embrace all those substances contained in plants, which are required, or are suitable in the process of digestion, to the formation of the animal elements, as for example, lime, phosphoric acid, &c.

Among the proximate constituents of plants, those which contain azote, or nitrogen hold the first rank, in reference to the food of animals. Then follow those containing carbon, and finally the mineral, though all three classes, together with water and oxygen are to be regarded as absolutely necessary conditions for the formation of the animal constituents. Every one of the usual fodder substances for horned cattle, contain all these three classes, only in very different proportions.

The vitality or activity of plants, and therefore also of the fodder plants, normally seizes only on those substances that are adapted to the character of the species; for vegetable physiology teaches us, that plants make a selection in the substances taken up by them. By means of this power of selection of the nutritious substances necessary to their development, one and the same species according to the rule, when their functions are undisturbed, always produces the same quality, but not always the same proportional quantity of the elements peculiar to their kind and species. This proportional quantity may depend on a multitude of modifications hitherto not sufficiently known.

Differences exist in reference to the quantity of the proximate vegetable constituents, according to the place, time and circumstances of growth. Air, light, heat, moisture, condition of the soil, improvement, and in reference to the last especially, the quantity and kind of manure, have more or less influence on the quantity of the constituent part, as well as on the nutritiousness of the plants themselves.

At the same time also, climate, soil and culture operate more or less on their formation of the same. These facts proved by analysis, justify the conclusion that plants, according to the standard of the greater or less existence of the conditions necessary to their general development, also produce their various proximate constituents, conformed in a greater or less degree to these conditions; for example, the beet, on a strong soil, manured with animal, and especially sheep dung, produces less sugar and more nitre. Wheat on land manured with dung, containing a large quantity of nitrogen, possesses less farina, but more gluten; while on the contrary it rejects that portion of matter, which contains nitrogen and assimilates that of amylum, when the seed has been manured more with a dung containing carbon; as the experiments of Hermbstädt and others have sufficiently shown.

The change in the quantity of nutritious elements of the fodder stuffs, thus modified by the influences of nature and culture, may also exert an influence on the nutritiousness of the fodder-stuffs of which we are now treating, in the use of the same for food.

Further; the capacity of nutrition of the proximate vegetable elements to be nourished, varies essentially from each other, and their nutritive powers among themselves and to each other is not yet established by a sure method. The nitrogen of the vegetable constituents can produce in animal bodies, by assimilation, only combinations of products containing nitrogen; the carbon only those containing carbon; and the mineral again, only mineral ones. It happens, therefore, very often, in the practical use of them, that we employ for the different objects of animal nutrition, also the corresponding substances which contain the elements promoting the object in view, in sufficient quantity, suitable proportions, and in a form that may be assimilated. He who wishes to fatten, therefore, stores up as much carbon as is required in the form of fat; and he must, besides the nitrogen needed for the formation of flesh, likewise provide in his fodder, for the carbon required for the formation of the fat; while he who tasks his oxen by severe labor must, as much as possible, look out for fodder containing nitrogen in solid form. Generally it is said, young cattle that are fed, yield for the same cwt. of hay a greater increase of live weight, than the full grown ones.

Many a kind of food peculiarly agrees or disagrees with one species of animals, as to nutritiousness or power of assimilation; as for example, with horned cattle, while they have a different value for horses. Many a sort of food is specially suited, or scarcely at all so, to many an object; as for example, to the production of milk, many a one is fitted to promote, or not so, endurance in labor; many a one the formation of flesh or fat, or otherwise. Although it is certain, on the other hand, that a food otherwise nutritious, and agreeing permanently with the animal, if, for example, it does not peculiarly aid the object in view, of the production of milk, yet at the same time may promote the formation of flesh or fat. Still, a person by the mistaken selection, has not obtained his object, of the increase of milk. In the choice, therefore, of fodder-stuffs, these should be estimated always in respect to their nutritiousness, for the kind of animal to which they are to be given, and especially the object which we have particularly in view in feeding them out.

The combination in which the fodder-stuffs are given, is important in general, and especially in reference to the objects in view; for the nutritiousness and power of being assimilated, of a fodder containing much carbon and little nitrogen, may be greatly raised by the addition of one containing nitrogen; because the different parts intended to be formed in animal bodies by fodder, can only be formed when the simple constituents, absolutely required for their formation, exist in the fodder in a form and quantity suitable to be assimilated. If this be not the case, in respect to a constituent absolutely necessary to the formation, then the formation of this animal constituent, for example, flesh or fat, takes place only in the proportion in which all the constituents of the food absolutely requisite for the result, exist in a form and quantity adapted to the capacity of assimilation of the animal. In consequence of the insufficient form or quantity of a single indispensable constituent in the fodder, all the other elements which are found in the fodder, and which could otherwise be employed for the formation of animal substance, are cast out as useless, by means of the excrements.

I would not, however, have it understood, that the farmer has it fully in his power, by very accurate combination of the different nutritious substances, to employ, for example, all the carbon or nitrogen that can be assimilated to form flesh or fat, for which, according to Boussingault's investigations,* a cwt. of fine hay, dried in the air, contains about seven and a half lbs. of crude flesh.

There are different degrees of the capacity of assimilation, in animals, as well, according to the standard of the different species as also in reference to the individual power of appropriation; but in no case is there a capacity of a perfect absorption, to appropriate all the nutritious substances existing in the fodder, though they may accord ever so closely with the object in view, in respect to their separate elements. For, in this case, the dung would be nearly worthless for its object. (I profess, myself, indeed, in respect to the theory of manure, in consequence of particular convictions recently established by experiments on the new theory, to be of the old school on this subject.)

In addition to the above, I will only say, that if any one so combines the fodder-stuffs, that these, in respect to constituent parts, as well as in regard to form and quantity, bear the best proportion to the elements of that which is to be produced in the way of assimilation by the fodder; he can also attain, in the object in view, the best increase corresponding to the particular capacity of appropriation possessed by the animal. This is proved by the fact, that men and beasts, living on abundant, and almost exclusive use of potatoes, secrete, in solid excrements, a quantity of undecomposed grains of farina, of which not a single trace can be discovered, when that food is replaced by flesh, grain, or other gluten, or, in general, substances containing nitrogen, and with the nitrogen, of which the carbon in the animal body, before useless as farina, now yields higher products in favor of the object to be obtained by feeding. † Similar results have followed my numerous experiments.

Their form, also their volume, and the preparation with which the nutritious substances are given to animals, exercise an influence on their greater or less nutritiousness, as well as on the results to be produced by them. The raw solid form more excites the organs of digestion than the fluid or prepared, and is, on the contrary, less easily assimilated. The raw solid form is much better adapted to the purpose of endurance in labor. The fluid prepared form, to the object of increased production of flesh and fat, or of milk. Food-stuffs, which are but little nutritive in large volume, may, with suitable preparation, be fed out mixed with those that are corresponding, but very nutritious, if that food which increases their products is desired from them.

The nutritiousness of grain will be raised by bruising, fermentation, baking into bread, and cooking; that of the raw food stuffs by steaming, brewing, self-heating; that of turnips and cabbage by pickling. All substances gain by saturation, or mixing with salt.

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*Boussingault's Agriculture, in its relation to Chemistry, pp. 264, 267

†Liebig's Organic Chemistry, pp. 119, 120.

The present year, for example, in feeding with raw potatoes, already sprouting, toward the close of the fattening, I had not a single case of tympanitis (wind dropsy,) when using a strong daily dose of salt; while in former years, especially in foddering out raw full grown potatoes, and only two doses of salt per week, frequent cases of tympanitis prevailed in the fattening stalls; to prevent which, as well to attain a better digestion, and an increased absorption for moderate fattening oxen, a daily dose of salt, from 3 to 4 loth, (equals ½ to 2 ounces) of pounded cooking salt, mixed with $\frac{1}{16}$ loth, (i. e. ⅛ ounce) of crude pounded antimony, was given.

I have attempted to show, in the foregoing remarks, that the fodder-stuffs, according to the difference of the kind of animals, and to that of the object in view from the fodder, with the combination, the form and preparation in which it is given, according also to the influence of the soil, climate and culture, in which they grow, yield different products. Further that the value of the proximate vegetable constituents, for example, of gluten, farina, &c., intrinsically and in relation to each other, almost ever, yet not always arises from the above stated causes, by which the more extended result is produced; so that no definite and correct rules can be given in all circumstances; that consequently, the ascertaining the nutritious constituent parts, by analysis, can the less furnish a sure point of support, as analyses give results greatly varying from each other, and the analyses into the remoter, or simple elements do not prove whether the substances to be regarded as nutritious, also exist in a form capable of assimilation in fodder stuffs; for we may consider almost all plants which contain nitre as nutritious, because this substance contains nitrogen.

The practical use of analysis in its accurate arithmetical application to the attainment of definitely proposed results of feeding, for a set time, with a previously fixed quantity and quality of fodder-stuffs, in the case of animals determined according to species and weight—is therefore very doubtful, and judgments sustained by it only, will always bear the stamp of hypotheses hazarded and not to be depended on, which are adopted unwillingly and uncertainly merely because we are in want of better ones.

Only comparative experiments, instituted with great circumspection, can give a sure point of support as to the value of a fodder-stuff for a species of animals according to the particular object proposed by the fodder, and according to its combination, form and preparation. But the animal must be fed at least 8 to 12 days before the beginning of trial, with the fodder to be subjected to the proof, in order that it may become accustomed to the food, and to bring it up to the live weight which corresponds to the fodder; since voluminous innutritious food usually renders the animal heavier in live weight for the mass necessary to be used for nutriment, without its yielding an increase in flesh or fat; but very extreme fattening often produces the contrary effect. After this period, the animals should be weighed alive, their weight separately noted, and the per centum of tallow determined.

Then the feeding must be carried on, as much as possible, by daily weighing the fodder, in the usual air-dried state, and as far as may be, with exactly the same preparation and combination, and also allowing entire freedom of the animal from labor, at least 30 or 40 days. In case of the milk cow, the milk must be measured and determined as to quality, by a lactometer, the animals weighed at short intervals, as far as possible every day at the same hour, in order, by frequent weighing, to counteract the fluctuations of weight produced by more or less drink, or greater or less fulness of food; and averages of weight from time to time, deduced therefrom. The unconsumed fodder must be daily weighed over, on which account, every animal should have his own fodder-bag, or particular fodder-bin denoted by number.

In such a trial, every thing must be accurately designated. Such an experiment, conducted with caution, can even then, in no wise, be regarded as the general determination of the nutritious power of the fodder stuff under investigation, intrinsically; but only as an experiment undertaken, with respect to this or that species of animal, and of the fodder stuffs examined in this or that quantity simply, or in combination with this or that preparation The proving of the simple substance, so far as it can be fed out without combination, must precede the proving of the combinations and preparations, and all the fodder stuffs proved, must be given to the animal in that quantity, which, according to the before mentioned hints, is to be considered best for it, in the measure of food reckoned or given, or, at least, approximating to the living cwt. of the animal.

Fine hay being the most frequent fodder stuff, and that which at first must be assumed as the standard of proportion for the others, must lie at the basis of the trial, and all the fodder stuffs, either simple, or in combination, must be compared with, or, which is better, be reduced to it, in respect to their nutritive power. Analyses may be useful in these provings, so far as they can indicate the constituent parts by the exhibition of the proportional quantity and properties for combining the fodder stuffs advantageously.

To the use of the many comparative experiments already made respecting so many fodder stuffs, I am opposed, because, as the majority of the same, even of the most recent, have been destitute of every one of the above pointed out precautions, and of accuracy, and therefore, of the proper certainty, I discard them, in order, after so long a confusion of this sort of views and opinions, to be able to fix upon certain principles for a future correct valuation of the different species of cattle fodder.

Relations of soil, climate, and culture, may always likewise occasion local varieties, but they cannot, to any extent, produce such differences as the superficial manner, in which such experiments have usually been conducted—when they have been carried on for a short period, the animals not repeatedly weighed before, during and after the experiments, and regard had to the increase, or decrease of the same; where the higher, or lesser live weight produced by the introduction of fodder instead of the increase or decrease of weight, happening only by the greater or less proportion of fodder introduced, which is the real increase or decrease, have been improperly brought into the account; and where finally, no proper regard has been paid to the daily variations of the animal, and, which is essential, to having the weighing done at the same hour, as well as to many other accidents exercising an influence over the results; and thus valuations have been introduced for one and the same fodder stuff, which differ with different experimenters about 100 or more per centum.

Such an experiment, to be certain, must be conducted under the regulation of fixed weight, until unquestionable observations have become available in averages of similar results respecting many animals, the value of the proved fodder stuff, and in the form, combination, and preparation tried. The space of these observations does not allow me to draw out here such an experiment or mode of proving in its details; but if these subjects should be published in the more extended form of the essay before mentioned, some of these results will be submitted for the instruction and judgment of others.

Of the Determination of the per centage of Fat or Tallow.

The present section relates to determining the per centage of tallow. This may be done by external marks.

It is somewhat difficult to describe the external marks that belong to this subject, so that every one may be in a situation to determine the proportion of tallow with some certainty. This is done by means of the fat-grips (*fett griffe*,) in oxen as they become fatter, appearing one after another, or in reference to their own increase.

In order to establish for every ox a proportionate relation suitable for all large cattle, we must determine the proportion of fat according to the per centage of tallow, i. e. how many lbs. of tallow there is in 100 weight of pure flesh weight of the four quarters; an ox of 5 cwt. of flesh, and ten per cent. of tallow will accordingly have 50 lbs. of tallow. By pure flesh weight in the four quarters is meant the simple trunk of the ox without head or fore feet—without generous or mean weight, and without tallow. An entirely lean ox, without any tallow, has scarcely any fat grip *(fett griffe)* and also no bend; the first grip which is found between the fore shoulder blades and the neck, on taking hold of entirely lean horned cattle, is the fat grip showing itself. We feel it so much the easier the more we cause the beast to turn his head and neck to the side where we stand. An entirely lean ox, which has scarcely any bend, has merely the tissue and hide for the reception of the tallow; for these in an ox of 1000 lbs. live weight, we may allow about 9 lbs., with which this empty fat reservoir may be weighed together with the tallow collected in the fattening.

At 5 per cent. of tallow, the bend begins to show itself in the form of a cord (*strange*) of the thickness of the little finger, running by the feeling along the fore-shoulder, between the neck and shoulder, from below upwards, while as yet no other grip can be noticed; it grows and loosens itself more and more continually, so that we may always find it easier and larger in the hand on bending the neck of the animal sideways; it becomes often tolerably thick until the side (*lanke*) begins to unfold itself, which is the second grip appearing on the corner of the belly between the belly and leg, (*schlagel*) [fore quarter?] in the case of which development just beginning and hardly yet noticeable, and the larger formed bend, the fattening ox, has 10 per cent. of tallow; a half developed, yet soft side, (*weiche lanke*,) with a pretty large bend, (or bow,) indicates 15 per cent. proportion of tallow; a pretty largely developed side (*lanke*) so that it fills the hand; an increasing sack, and greater bend indicates 20 per cent. of tallow. At 25 per cent. fat, we need more practical skill in distinguishing; the bend is large, solid, springs out of the hand; if we press it, it glides from under the hand, it fills the hand, is solid, slippery, but not hard, which latter instance is called a flesh bend; the side (*lanke*) is firm and large; we can scarcely any longer seize it in the hand; the sack is usually large and solid, although this latter is no very sure grip. The stomach hole, or opening, (*hungerluck*) is knotty, the hip-bone usually tender and doughy. This last grip, according to the rule, appears first when the other grips are well developed, and the animal is fat, although, with oxen, which have been taken very lean, oftentimes, also, it does not appear. It is the grip of the Italian butcher, but which usually is not specially distinguished from the former fat grips, which furnish the measure without its aid. The further marks of distinction up to 30 per cent. of tallow are hardly determinate enough to have the gradations of this grip described, and can only be shown practically.

After having thus given marks for the determination of per centage of tallow, I pass on to the estimate of pure flesh weight from the live weight.

On the Determination of the Flesh Weight from the Live Weight.

Horned cattle, which receive about 2½ to 3 lbs. hay value, as daily food on every hundred of live weight, of which the greater part is really hay, when weighed in a feeding state, according to the experiments adjusted by the new scale, produce hardly any fat—in which state their collective skin and tissue which is destined to receive the fat, are estimated at about 8 lbs., for 100 live weight per head—on 100 lbs. of pure flesh in the four quarters, without generous or mean weight, (?) and without reckoning the tallow as flesh, are estimated to give 260 lbs. of live weight.

At 5 per cent. proportion of tallow there is reckoned for 100 lbs. of pure flesh, 255 lbs. live weight.

At 10 per cent. proportion of tallow, is reckoned for 100 lbs. of pure flesh, 245 lbs. live weight.

At 15 per cent. proportion of tallow is reckoned for 100 lbs. of pure flesh, 235 lbs. of live weight.

At 20 per cent. proportion of tallow is reckoned for 100 lbs. of pure flesh, 225 lbs. of live weight.

If the food consists of very voluminous, but scarcely nutritious constituents—for example, straw, by which the stomach of the animal must be more extended and larger, in order to accommodate the mass necessary for nourishment—then may a person increase the gross weight required for 100 weight of flesh by about 5 per cent. For, example; at 5 per cent. tallow, 260 lbs. instead of 255 gross, or live weight. Moistened food usually produces more live weight than dry. But in how much lesser volume and weight, a great amount of nutritious matter is contained, so much smaller will be the belly of the animal, and so much less is the live weight gained for 100 weight of flesh; so that, for example, animals fed with simply oats, or bruised grain, if they have about 20 per cent. or over, of tallow, require only 180 to 190 lbs. live weight for 100 lbs. of flesh, because the food that is within weighs so much the less. An ox, also, which is in a hungry state, according to the standard, whether he be not fed, or not properly fed once, or a number of times, gives decidedly less live weight to a hundred of flesh weight; so that an ox of about 20 per cent. fat, kept on short allowance, for the purpose of slaughter, may lose one-seventh to one-fifth of his earlier live weight, when he was in a state of fattening; on which account about 190 pounds of live weight at 20 per cent. of tallow may give 100 weight of flesh. So, likewise, particular races of cattle, as well as the difference of fodder may exercise an influence upon it. It is, therefore, necessary to learn to understand his fodder and cattle account, and in some slaughter house to estimate the average live weight that is to be reckoned at an average for a hundred weight of flesh, the determination of which must always be made for one of the above designated per centages of tallow. In the proportion that the number found bears to that above designated per centage, in the same proportion, also, must the numbers annexed to the other per centages of tallow be raised, or reduced. As particular animals may vary, therefore, the averages of many slaughtered animals must be always brought in to aid such attempts at determination. The above proportional numbers are only the average numbers from many great averages of the races of cattle of this country. An ox which, from a supply of food of 2½ to 3 lbs. hay value daily per 100 lbs. live weight, if put on the mere sustaining fodder of 1½ lbs. of hay for 100 of that live weight, which he had previous to his being brought into a feeding state, or one of 1⅖ lbs. of hay for 100 cwt. of that live weight to which the animal is reduced by withholding the mere conservation fodder, loses after some days, from the original weight which he had previous to his completely feeding state about one-half to one-eighth of his original live weight: so that now, for example, at 10 per cent. proportion of tallow instead of the previous 245 lbs. he only has a live weight of 214 to 224 lbs. to 100 lbs. of flesh.

The increase in live, or brute weight at the end of the fattening, at 20 per cent. of tallow, is usually about one-third to one-seventh greater in the feeding state than the increase of flesh and tallow reckoned together amounts to in the same period.

I now pass on to estimation of pure flesh in the four quarters by measuring the thickness and length of the animal.

On the Mode of Determining the Flesh Weight by Measuring the Animal.

The pure flesh weight of the animal, in the four quarters may be determined with tolerable accuracy by measuring the length and thickness of the same. For our Carinthian cattle's account, Dr. Soller has cast tables, the use of which I have modified for our Carinthian breeds of cattle, in a paper printed in the Transactions, &c. (new series, vol. 3, pp. 248—268) of the Royal Steiermark Agricultural Society, and which is extracted and published in Prof. Hlubek's System of Agriculture, (vol. ii, 8th part, p. 383.) I annex to my present essay such a table, together with the modifications to be made in reference to it in the use of it among the different races.

The time allotted to this essay might be too long were I to give to so multifarious a subject only a development proportioned to circumstances, and many things must be left untouched, and probably obscure, which might be considered essential to a better foundation, and a clear view of the subject. I refer at this time to my already mentioned purpose to publish, before the appearance of my remarks on the subject under consideration, for the better illustration of the things here said, a fuller extract in the "Communications of the Carinthian Agricultural Society," as well as in the journal conducted by Dr. Hlubek, a course of observations which I would mention beforehand, should any one be inclined to give a further consideration to the subject here discussed; and, likewise, I should be pleased, should any one be desirous of it, to give many further explanations in writing.

Estate of Krumpendorf, near Klagenfurt, 6th *Sept.*, 1846.

Table in which is given the pure flesh weight, in Vienna pounds, of a head of cattle measured according to the following circumference and length in Vienna; [the pound Vienna being about one pound two ounces English, and the foot of twelve inches English.]

Circumference.	Length.	Flesh weight.	Circumference.	Length.	Flesh weight.	Circumference.	Length.	Flesh weight.	Circumference.	Length.	Flesh weight.	Circumference.	Length.	Flesh weight.
60	35	188.9	63	35	208.2		50	316.7		41	284.1		51	374.4
	36	194.3		36	214.4		51	323.0		42	291.1		52	381.8
	37	199.7		37	220.1		52	329.4		43	298.0		53	389.1
	38	205.1		38	226.0		53	335.7		44	304.9		54	396.5
	39	210.5		39	232.0		54	342.0		45	311.8		55	403.8
	40	215.9		40	237.9		55	348.4		46	318.8		56	411.2
	41	221.3		41	243.9		56	354.7		47	325.7		57	418.6
	42	226.7		42	249.8	66	36	235.2		48	332.6		58	425.9
	43	232.1		43	255.8		37	241.8		49	339.6		59	433.3
	44	237.5		44	261.8		38	248.3		50	346.5	71	39	294.8
	45	242.9		45	267.8		39	254.8		51	353.4		40	302.4
	46	248.3		46	273.8		40	261.4		52	360.4		41	309.9
	47	253.7		47	279.7		41	267.9		53	367.3		42	317.5
	48	259.1		48	285.6		42	274.4		54	374.2		43	325.0
	49	264.5		49	291.6		43	231.0		55	381.2		44	332.6
	50	269.9		50	297.5		44	287.5		56	388.1		45	340.2
	51	275.2		51	302.4		45	294.0		57	395.0		46	347.7
	52	280.6		52	309.4		46	300.5		58	401.9		47	355.3
61	35	195.1		53	315.3		47	307.1		59	408.9		48	362.8
	36	200.7		54	321.3		48	413.6	69	37	264.0		49	370.4
	37	206.2	64	35	214.9		49	320.2		38	271.2		50	378.0
	38	211.8		36	221.0		50	326.7		39	278.3		51	385.5
	39	217.4		37	227.2		51	433.2		40	285.4		52	393.1
	40	223.0		38	233.3		52	339.8		41	292.6		53	400.6
	41	228.5		39	239.4		53	346.3		42	299.7		54	408.2
	42	234.1		40	245.6		54	352.8		43	306.8		55	415.8
	43	239.7		41	251.7		55	359.4		44	344.0		56	423.3
	44	245.3		42	257.9		56	365 9		45	321.1		57	430.9
	45	250.8		43	264.0		57	372.4		46	328.3		58	438.4
	46	256.4		44	270.2	67	38	248.8		47	335.4		59	446.0
	47	262.0		45	276.3		38	255.6		48	342.5		60	453.6
	48	267.6		46	282.4		39	262.3		49	349.7		61	461.1
	49	273.4		47	288.6		40	269.0		50	356.8	72	39	302.9
	50	278.7		48	294.7		41	275.8		51	363.9		40	310.7
	51	284.3		49	300.9		42	282.5		52	371.1		41	318.5
	52	289.9		50	307.0		43	289.2		53	378.2		42	326.2
62	35	201.6		51	313.4		44	295.9		54	385.3		43	334.0
	36	207.3		52	319.1		45	302.7		55	392.5		44	344.8
	37	213.1		53	325.4		46	309.4		56	399.6		45	349.6
	38	128.9		54	331.6		47	316.1		57	406.8		46	357.3
	39	224.6		55	337.7		48	322.8		58	413.9		47	365.1
	40	230.4	65	36	228.0		49	329.6		59	421.0		48	372.9
	41	236.2		37	234.3		50	336.3	70	38	279.0		49	380.6
	42	241.9		38	240.7		51	343.0		39	286.3		50	388.4
	43	247.7		39	247.0		52	349.8		40	293.7		51	396.2
	44	253.4		40	253.4		53	356.5		41	301.0		52	403.9
	45	259.2		41	259.7		54	363.2		42	308.4		53	411.7
	46	265.0		42	266.0		55	369.4		43	315.7		54	419.3
	47	270.7		43	272.4		56	376.7		44	323.0		55	427.0
	48	276.5		44	278.7		57	383.4		45	330.4		56	434.8
	49	282.2		45	285.0		58	390.1		46	337.7		57	442.6
	50	288.0		46	291.4	68	39	256.4		47	345.1		58	450.4
	51	293.8		47	297.7		38	263.3		48	352.4		59	458.1
	52	299.5		48	304.0		39	270.3		49	359.8		60	465.6
	53	305.3		49	310.4		40	277.2		50	367.1		61	473.6

Table—Continued.

Circumference.	Length.	Flesh weight.	Circumference.	Length.	Flesh weight.	Circumference.	Length.	Flesh weight.	Circumference.	Length.	Flesh weight.	Circumference.	Length.	Flesh weight.
	62	481.3		49	413.2		59	524.6	80	44	422.1		54	544.6
73	39	311.6		50	421.7		60	533.7		45	431.7		55	554.6
	40	319.6		51	430.1		61	542.6		46	441.3		56	564.7
	41	327.5		52	438.5		62	551.3		47	450.5		57	574.7
	42	335.5		53	447.0		63	560.4		48	460.5		58	584.8
	43	343.5		54	455.4		64	569.0		49	470.1		59	594.9
	44	351.5		55	463.8		65	579.9		50	479.7		60	505.0
	45	359.5		56	472.3		66	586.8		51	489.3		61	515.1
	46	367.5		57	480.7	78	42	383.6		52	498.5		62	625.1
	47	375.5		58	487.4		43	392.7		53	508.0		63	635.2
	48	383.5		59	497.6		44	401.8		54	518.1		64	645.3
	49	391.5		60	506.0		45	411.0		55	527.7		65	655.4
	50	399.5		61	514.4		46	420.1		56	637.3		66	665.5
	51	407.4		52	522.9		47	429.2		57	546.9		67	675.6
	52	445.4		63	531.3		48	438.4		58	556.5		68	685.7
	53	423.4		64	539.7		47	447.5		59	566.1		69	695.8
	54	431.4	76	40	346.4		50	456.7		60	575.7		70	705.9
	55	439.4		41	355.1		51	465.8		61	585.2		71	715.9
	56	447.4		42	363.7		52	474.9		62	596.8	83	47	485.2
	57	455.4		43	372.4		53	484.1		63	604.4		48	495.6
	58	463.4		44	381.0		54	493.2		64	624.0		49	505.9
	59	471.4		45	389.7		55	502.3		65	623.6		50	516.2
	60	479.4		46	398.4		56	511.5		66	633.2		51	526.5
	61	487.3		47	407.0		57	520.6		67	642.8		52	536.9
	62	495,3		48	415.7		58	529.7		68	652.4		53	547.2
	63	500.3		49	424.3		59	538.9		69	661.9		54	557.5
74	39	320.1		50	433.0		60	548.0	81	45	442.7		55	567.8
	40	328.3		51	441.7		61	557.1		46	452.4		56	578.1
	41	336.5		52	450.3		62	566.3		47	462.3		57	588.4
	42	344.7		53	459.0		63	575.4		48	472.3		58	598.7
	43	352.9		54	467.6		64	584.5		49	482.0		59	609.0
	44	361.1		55	476.3		65	593.7		50	491.9		60	619.4
	45	369.4		56	485.0		66	602.8		51	501.7		61	629.7
	46	377.6		57	493.6		67	611.9		52	511.5		62	640.0
	47	385.8		58	502.3	79	43	402.2		53	521.4		63	650.3
	48	394.0		59	510.9		44	411.6		54	531.2		64	660.7
	49	402.2		60	519.6		45	420.9		55	541.0		65	671.0
	50	410.1		61	528.3		46	430.3		56	650.9		66	681.0
	51	418.6		62	537.9		47	439.6		57	560.7		67	691.6
	52	426.8		63	545.6		48	449.0		58	570.6		68	702.0
	53	435.0		64	554.3		49	458.3		59	580.4		69	712.3
	54	443.2		65	562.9		50	467.7		60	590.2		70	722.6
	55	451.4	77	41	364.5		51	477.1		61	600.1		71	732.9
	56	459.7		42	373.4		52	486.4		62	609.9		72	743.2
	57	467.9		43	382.3		53	495.8		63	619.7	84	48	507.6
	58	476.1		44	391.2		54	505.1		64	629.6		49	518.2
	59	484.3		45	400.1		55	514.5		65	639.1		50	628.3
	60	492.5		46	409.0		56	523.8		66	649.3		51	639.4
	61	500.7		47	417.9		57	533.2		67	659.1		52	550.0
	62	508.9		48	426.8		58	542.5		68	668.9		53	560.5
	63	517.1		49	435.7		59	551.9		69	678.8		54	571.1
75	40	337.3		50	444.6		60	561.3		70	688.6		55	581.7
	41	345.7		51	453.4		61	570.6	82	46	463.8		56	592.3
	42	354.2		52	462.3		62	580.0		47	473.9		57	602.8
	43	362.6		53	471.2		63	589.3		48	484.0		58	613.4
	44	371.0		54	480.1		64	598.7		49	494.1		59	624.0
	45	379.5		55	489.0		65	608.0		50	504.2		60	634.6
	46	387.9		56	497.9		66	617.3		51	514.2		61	645.1
	47	396.3		57	506.8		67	626.6		52	524.3		62	655.7
	48	404.8		58	515.7		63	635.9		53	534.4		63	666.3

Table—Continued.

Circumference.	Length.	Flesh weight.	Circumference.	Length.	Flesh weight.	Circumference.	Length.	Flesh weight.	Circumference.	Length.	Flesh weight.	Circumference.	Length.	Flesh weight.
	64	676.9		74	820.5		53	629.3		59	732.5		66	855.0
	65	687.5		75	831.6		54	641.2		60	744.9		67	868.0
	66	698.0	87	50	567.2		55	653.1		61	757.3		68	881.0
	67	708.6		51	578.5		56	664.9		62	769.7		69	893.9
	68	719.2		52	589.8		57	676.8		63	782.2		70	906.9
	69	729.8		53	601.2		58	688.7		64	794.6		71	919.8
	70	747.3		54	612.5		59	700.6		65	807.0		72	932.8
	71	759.9		55	623.9		60	712.4		66	819.4		73	945.7
	72	761.5		56	635.2		61	724.3		67	831.8		74	958.7
	73	772.1		57	646.6		62	736.2		68	844.2		75	971.7
85	49	530.7		58	657.9		63	748.0		69	856.6		76	984.6
	50	541.6		59	669.2		64	759.9		70	869.1		77	997.6
	51	552.4		60	680.6		65	771.8		71	881.5		78	1010.5
	52	563.2		61	691.9		66	783.7		72	893.9		79	1023.5
	53	574.0		62	703.3		67	795.5		73	906.3		80	1026.4
	54	584.9		63	714.6		68	807.4		74	918.7	94	54	715.6
	55	595.7		64	726.0		69	819.3		75	931.1		55	728.8
	56	606.5		65	737.3		70	831.2		76	943.6		56	742.0
	57	617.4		66	748.7		71	843.0		77	956.0		57	755.8
	58	628.2		67	760.0		72	854.9		78	968.4		58	768.5
	59	639.0		68	771.3		73	866.8		79	980.8		59	781.8
	60	649.9		69	782.7		74	878.7	92	53	672.6		60	795.0
	61	660.7		70	794.1		75	890.5		54	685.3		61	808.3
	62	671.5		71	805.4		76	902.4		55	698.0		62	821.5
	63	682.4		72	816.7		77	914.2		56	710.7		63	834 8
	64	693.2		73	828.1		78	926.0		57	723.4		64	848.0
	65	704.0		74	839.4	90	51	620.7		58	736.1		65	861.3
	66	714.9		75	850.8		52	632.9		59	748.7		66	874.5
	67	725.7		76	862.1		53	645.1		60	761.4		67	887.8
	68	736.5		77	873.4		54	657.2		61	774.1		68	901.0
	69	747.4	88	50	580.7		55	669.4		62	786.8		69	914.3
	70	758.2		51	592.3		56	681.6		63	799.4		70	927.5
	71	769.0		52	603.9		57	693.8		64	812.1		71	940.8
	72	779.9		53	615.5		58	705.9		65	824.8		72	954.0
	73	790.7		54	627.1		59	718.1		66	837.5		73	967.3
	74	801.5		55	638.7		60	730.3		67	850.2		74	980.5
86	50	554.4		56	650.3		61	742.4		68	862.9		75	993.8
	51	565.5		57	661.9		62	754.6		69	875.6		76	1007.0
	52	576.6		58	673.6		63	760.8		70	888.3		77	1020.3
	53	587.7		59	685.2		64	779.0		71	901.0		78	1033.5
	54	598.8		60	696.8		65	791.1		72	914.7		79	1046.3
	55	609.8		61	708.4		66	803.3		73	926.3		80	1060.0
	56	620.9		62	720.0		67	815.5		74	939.0	95	55	739.2
	57	632.0		63	731.6		68	827.6		75	951.7		56	752.6
	58	643.1		64	743.2		69	839.8		76	964.3		57	766.0
	59	654.2		65	754.9		70	852.0		77	977.0		58	779.5
	60	665.3		66	766.5		71	864.2		78	989.7		59	792.9
	61	676.4		67	778.1		72	876.3		79	1002.4		60	806.4
	62	687.5		68	789.7		73	888.5	93	54	699.6		61	819.8
	63	698.6		69	801.3		74	900.7		55	712.5		62	833.3
	64	709.6		70	812.9		75	912.9		56	725.5		63	846.7
	65	720.7		71	824.5		76	925.0		57	738.4		64	860.1
	66	731.8		72	836.2		77	937.2		58	751.4		65	873.6
	67	742.9		73	847.8	91	52	645.6		59	764.4		66	887.0
	68	754.0		74	859.4		53	658.0		60	777.3		67	900.0
	69	765.1		75	871.0		54	670.4		61	790.3		68	913.9
	70	776.2		76	882.6		55	682.8		62	803.2		69	927.3
	71	787.3		77	894.2		56	695.2		63	816.2		70	940.8
	72	798.4	89	51	605.5		57	707.4		64	829.1		71	954.2
	73	809.4		52	617.4		58	720.1		65	842.1		72	967.7

Table—Continued.

Circumference.	Length.	Flesh weight.	Circumference.	Length.	Flesh weight.	Circumference.	Length.	Flesh weight.	Circumference	Length.	Flesh weight.	Circumference.	Length.	Flesh weight.
	73	981.1		74	1022.7		76	1072.0		78	1123.3		80	1176.0
	74	994.6		75	1036.5		77	1086.3		79	1137.7	100	57	854.4
	75	1007.0		76	1050.3		78	1104.0		80	1152.1		58	869.4
	76	1021.4		77	1064.2		79	1114.5	99	56	823.2		59	884.4
	77	1034.9		78	1073.0		80	1128.6		57	837.9		60	899.4
	78	1043.3		79	1092.8	98	56	806.5		58	852.6		61	914.3
	79	1061.8		80	1106.6		57	820.9		59	867.3		62	929.3
	80	1075.2	97	56	790.0		58	835.3		60	882.0		63	944.3
96	55	759.9		57	804.1		59	849.7		61	896.7		64	959.3
	56	773.7		58	818.2		60	864.1		62	911.4		65	974.3
	57	787.5		59	832.3		61	878.7		63	926.1		66	989.3
	58	801.3		60	846.4		62	892.9		64	940.8		67	1004.3
	59	815.2		61	860.5		63	907.3		65	955.5		68	1019.3
	60	829.0		62	874.6		64	921.7		66	970.2		69	1034.3
	61	842.8		63	888.8		65	936.1		67	984.9		70	1049.3
	62	856.6		64	902.9		66	950.5		68	999.0		71	1064.3
	63	870.4		65	917.0		67	964.9		69	1014.3		72	1079.2
	64	884.2		66	931.1		68	979.3		70	1029.0		73	1094.2
	65	898.1		67	945.2		69	993.7		71	1043.7		74	1109.2
	66	912.0		68	959.3		70	1008.1		72	1058.4		75	1124.2
	67	925.8		69	973.4		71	1022.5		73	1073.1		76	1139.2
	68	939.6		70	987.5		72	1036.9		74	1087.8		77	1154.2
	69	953.5		71	1001.6		73	1051.3		75	1102.5		78	1169.2
	70	967.3		72	1015.7		74	1065.7		76	1117.2		79	1184.2
	71	981.2		73	1029.8		75	1080.1		77	1131.9		80	1199.2
	72	995.5		74	1043.9		76	1094.5		78	1140.6			
	73	1008.9		75	1058.0		77	1108.9		79	1161.3			

[Some deductions in genera' may be made from this table.—

It will be seen that at 60 inches circumference the increase for each inch in length is 5.4 lb; at 61 inches the increase is 5.6 lb; for 62 inches 5.8 lb; at 63 inches it is about 5.7 lb; at 64 inches about 6 lb; at 65 inches about 6.3 lb; at 66 inches about 6.5 to 6.6 lb; at 67 inches about 6.7 lb; at 68 inches about 6.9 lb. and on; at 69 inches about 7.2 lb; at 70 inches about 7.4 lb; at 71 inches about 7.6 lb; at 72 inches about 7.8 lb; at 73 inches about 7.9 to 8 lb; at 74 inches about 8.2 lb; at 75 inches about 8.4 lb; at 76 inches about 8.6 lb; at 77 inches about 8.9 lb. at 78 inches about 9.1 to 9.2 lb; at 79 inches about 9.3 to 9.4 lb; at 80 inches about 9.6 lb; at 81 inches about 9.7 to 9.9 lb; at 82 inches about 10 lb; at 83 inches about 10.3 lb; at 84 inches about 10.6 lb; at 85 inches about 10.8 lb; at 86 inches about 11.1 lb; at 87 inches about 11.3 to 11.4 lb; at 88 inches about 11.6 lb; at 89 inches about 11.8 to 11.9 lb; at 90 inches about 12.2 lb; at 91 inches about 12.4 lb; at 92 inches about 12.6 to 12.7 lb; at 93 inches about 12.9 lb; at 94 inches about 13.4 lb; at 95 inches about 13.4 lb; at 96 inches about 13.8 to 13.9 lb; at 97 inches about 14.1 lb; at 98 inches about 14.4 lb; at 99 inches about 14.7 lb; at 100 inches about 15 lb.

The general averages therefore would seem to be, for there are obviously some errors in the figures, an allowance of two-tenths to three-tenths of a lb. for each additional inch of circumference on the various circumferences, from 61 inches up to 100. The length also for which the calculations are made vary somewhat; thus for 60 to 61 the range is from 35 to 52; for 62, 35 to 53;

for 63, 35 to 54; 64, 35 to 55; 65, 36 to 56; 66, 36 to 57; 68 and 69, 37 to 59; 70, 38 to 59; 71, 39 to 61; 72, 39 to 62; 73 and 74, 63; 75, 40 to 64; 76, 41 to 66; 78, 42 to 67; 79, 43 to 68; 80, 44 to 69; 81, 45 to 70; 82, 46 to 71; 83, 47 to 72; 84, 48 to 73; 85, 49 to 74; 86, 50 to 75; 87, 50 to 77; 88, 50 to 77; 89, 51 to 78; 90, 51 to 78; 91, 52 to 79; 92, 53 to 79; 93, 54 to 80; 94, 44 to 80; 95, 55 to 80; 96, 55 to 80; 97, 56 to 80; 98, 56 to 80; 56 to 80; 99, 56 to 80; 100, 57 to 80; making an average of about 1 from the lowest and an addition of one to the highest number of inches under each ratio of circumference.]

ON RAISING CALVES.

Translated from the German of the *Das Neueste in Gebiete der Land und Forstwirthschaft, so wie deren technischen nebenfacher*, by E. Goodrich Smith of the Patent Office.

At one of the conventions of the German agriculturists and foresters, the following remarks respecting the raising of calves, were made by Baron Von Riedesdel as the result of his experiments:—

The calf should receive from its birth till it is ten times of its then weight, daily, the same food in hay value, in which we reckon one pound of milk equal to one pound of hay. The food should be changed accordingly to that only in substance and volume, not in nutritive value, up to that time, and therefore be daily one-third hay value of the animal's weight. If for example the calf at its birth weighs ninety pounds, then its food from the beginning must be continually thirty pounds hay value. When the young animals have attained to ten times their bodily weight, which will be the case in a year without labor, then they are nearly of the bodily size of their dams, and may be used for breeding. If it could, therefore, with the other disadvantages, be brought into early use, which is otherwise so strongly prohibited, the advantage on the above mentioned supposition is self-evident, for during every cessation in its growth, every development which is prevented by any deficiency in food, results in a clear loss.

Grown up cows, according to Riedesdel, must have the thirtieth part of their live weight in hay value, by which the most satisfactory milk product may be obtained, according to the standard of fodder; so that with such feeding the well kept cow may yield five times her bodily live weight yearly in milk.

Baron Riedesdel, also, after acknowledging that he had little success in raising cattle, till on repeating Schweitzer's experiments, he found that the conclusions he derived respecting this subject were correct, lays down the following as his rules:—

1. He set apart no more calves for breeding than were necessary to the perpetuation of his noble herd of cattle, because the raising of them costs him very high.

2. He does not fix on any calf, if it weighs less than one-tenth of its mother's weight at birth.

3. When this is the case, and in every instance, he takes care that the *calf* should have daily as much milk from its mother as one-third of its own live weight.

4. If deficient in any important respect, he gives up raising it and sells it

5. The same is the case when the calf is affected by any disease or casualty, *since disease scarcely ever occurs with the nutriment proportioned justly;* it must therefore be an infectious disease.

6. The first four weeks of its life the calf must receive the whole of its mother's milk, because in this period the nutrition contained in the milk in so small volume can be replaced by no other equally nutritious and as easily digestible means of food.

7. After four weeks the milk may be replaced by that means of fodder which contains nutritious substance next to it in equal weight of dry volume, in the greatest possible amount.

8. The withdrawal of milk is to be advised only gradually—one-eighth or one-fourth of the quantity daily.

9. The milk is most easily and advantageously replaced by means of thickened sweet milk.

10. This method of supply is possible only when we make sweet milk cheese, otherwise use meal or groats of grain.

11. But before the calf is four weeks old, it begins to play with hay and straw, and gradually to eat more and more hay.

12. The animal, however, must never be compelled by hunger to eat hay, but give it in place of milk, in dry volume, and in increasing capacity of nutriment every time as much as the milk would contain, that would otherwise have been given.

13. We now advance in the course of feeding, to give the proportion of nutrition in always increasing volume.

14. This process of feeding being always proportionately increased, the animal grows in the same manner as at the beginning, yet, as mentioned, it is always proportionately weaned, until its body has developed the mass, to attain which it was designed at its birth.

Formerly Baron Riedesdel caused his heifer calves, at the age of six to seven months, after they had reached the size of their dams, to take the bull, so that they calved at sixteen months old. But observing that his young animals were not yet grown up, when they had reached the size of their dams, and even surpassed them in size, he afterwards caused the heifers to take the bull when at full two years old.

Riedesdel was satisfied with this new plan; his heifer calves, now, on completing their second year, at fourteen to fifteen hundred pounds weight, cost him, on each hundred pounds of live weight, a little over fifteen hundred weight of hay value; while before they weighed, on the completion of their third year, at the highest, only one thousand pounds of live weight; and every hundred pounds of live weight cost about eighteen and three-fifth hundred weight of hay value in fodder. The bull for coupling at a year old is perfectly fitted for his work, and on the completion of the second year, when he attains to seventeen hundred to eighteen hundred pounds live weight, he is, in his capacity for service, superior to the stoutest stallion.

ON FEEDING SHEEP.

Experiments on the proportion of food to be given to sheep, by G. Ockel, director of husbandry at Frankenfelde, near Berlin—translated from the German by E. Goodrich Smith, of the Patent Office.

A respected college of land husbandry in Berlin, in the autumn of last year, honored me with the commission of repeating the interesting, and, for our cattle breeders, most important experiments undertaken by the minister, Herr Von Weckherlin, at Hohenheim, in order to determine the animal production according to the scale of feeding, and also as to the most useful quantity of fodder for sheep; but with this modification, that half of the hay fodder should be supplied by potatoes.*

These experiments were made in the period, from the first of January to the twenty-eighth of May, of this year; and I make an extract from the Transactions of the highly respected convention.

On the 30th of December, of last year, the animals necessary for the experiment, viz: two and a half year old ewes and half year old lambs, were selected from the same flock, which, for a course of years, had shorn ten and a half to eleven stone, [a stone equals twenty-two lbs.,] per one hundred head, and the wool of which, in former years, had been valued at 1125 rix dollars, [equal to seventy cents each,] per cwt.; and little wooden tablets with consecutive numbers hung around their necks. Then the whole of them, sheep and lambs, collectively, were shorn, the fleeces accurately weighed, and each one placed in a particular basket, furnished with the number of the animal referred to, in order to be kept locked up till the spring, and then every fleece to be washed separately. Next, all the animals were accurately weighed, and their weight, together with their tablets and tattooed numbers put down in a list, according to which they were then divided into sections as the object of the experiment required.

The feeding of the experimental animals were committed to the sheep master, and a trusty scholar of the school of shepherds. This feeding took place in the morning at nine o'clock, and at three o'clock in the afternoon; and was many times, weekly, under my own superintendence. At the weighing of the animals, which was always on the first day of every month before nine o'clock in the morning, I was every time present. On the 27th of May, the experimental animals had their last food, and on the 28th of May, before nine in the morning, they were weighed with the wool, and then immediately shorn. The wool of every animal was weighed unwashed, and then all the fleeces, from December and May shearings, were separately washed in baskets, and after they were dried they were again weighed.

The separate experiments were tried in the method pointed out by Herr Von Weckherlin.

Experiment I.—*How the conservation fodder† must be established as to the bodily weight, and in what proportion the fodder aiding the production, i. e. beyond mere conservation, operated for making flesh, i. e. bodily increase, and wool, accordingly as more or less of it was given.*

Four divisions were set apart, of which each contained *four* two and a half year old sheep at an average of sixty-eight lbs. bodily weight per head, and to which were apportioned the appointed food, according to the hay value, [i. e. a quantity equal in value to a supposed quantity of hay,] one half in clover-hay and the other half in potatoes.

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* At the general meeting of the tenth convention of German agriculturists, on the 19th of September, 1846, it was resolved, that this communication should be separately printed and distributed to the members of the association, and also sent to the different agricultural associations of Germany. This resolution is a most decisive proof of the importance and interest attached to this paper by that large and respectable body.

† The feed necessary to keep an animal in its present state is called *conservation fodder.* All over and above this which tends to increase, *production fodder.*

The *first division* received one-sixtieth of bodily weight in hay value; its weight was two hundred and seventy-one pounds and twelve loth, [a loth is about a half ounce,] therefore, four pounds sixteen loth of potatoes and two pounds eight loth of clover hay, or one pound four loth hay value per head.

	lbs.	loth.
The animals consumed in 148 days, in hay value,	661	16
Their weight at the close of the experiment, including wool,	196	3
Decrease of bodily weight, therefore,	80	26
And *decrease* of flesh on 10 lbs. of production fodder,	9	22
The *increase* of clean washed wool was	4	12
Therefore, on 10 lbs. of production fodder,		17$\frac{1}{2}$

The *second division* $\frac{1}{45}$ of bodily weight in hay value, its weight was 272 lbs. 12 loth—therefore, 6 lbs. 2 loth of potatoes, and 3 lbs. 1 loth of clover hay, or 1 lb. 16$\frac{1}{2}$ loth, hay value, per head.

	lbs.	loth.
The animals consumed in 148 days, in hay value,	891	6
Their weight at the close of the experiment, including wool,	236	26
Therefore, the *decrease* of bodily weight,	42	5
And *decrease* of flesh in 10 lbs. of production fodder,	1	18
The *increase*, in clean washed wool was		4
Therefore, on 10 lbs. of production fodder,		4$\frac{8}{9}$

The *third division* received one-tenth of bodily weight in hay value: its weight was 272 lbs. 2 loth—therefore 9 lbs. 2 loth of potatoes, and 3 lbs. 1 loth of clover hay, or 2 lbs. 8 loth, hay value, per head.

	lbs.	loth.
The animals consumed in 148 days, in hay value,	1332	6
Their weight at the close of the experiment, including wool,	288	14
Therefore, *increase* of bodily weight, besides wool, was	8	20
And *increase* of flesh in 10 lbs. production fodder,		4$\frac{1}{8}$
The *increase* of clean washed wool was	5	7

The *fourth division* finally received one-twentieth of bodily weight, in hay value: its weight was 271 lbs. 19 loth—therefore 13 lbs. 18 loth of potatoes, and 6 lbs. 25 loth of clover hay, or 3 lbs. 12$\frac{1}{2}$ loth of hay value, per head.

	lbs.	loth.
The animals consumed in 148 days, in hay value,	1995	20
Their weight, at the close of the experiment, including wool,	329	27
Therefore, the *increase* of bodily weight, besides wool,	49	20
And *increase* in flesh, on 10 lbs. production fodder,		12$\frac{3}{4}$
The *increase* in clean washed wool,	5	8
Therefore, on 10 lbs. production fodder,		1$\frac{1}{3}$

The three first divisions fell off very perceptibly, in January, and respectively so about 59 lbs. 3 loth, 34 lbs. 26 loth, and the fourth division gained only about 29 loth. This, indeed, was the result of the change of fodder, and the change to the rough temperature to which they were exposed by the shearing off of the wool. In April, also, there was exhibited a stronger decrease, or a decidedly smaller increase than in February, March and May; because the experimental sheep were much disturbed by the driving out of the other sheep.

The wool of the first division maintained an equally proportioned growth; but it was weak and tender, and of little use for manufacture. The wool of the other divisions was good, only the fourth was too thick, and loaded with greasy sweat, on account of which it sustained the greatest loss of weight on being washed.

EXPERIMENT II.—*Whether large or small animals, with food in equal proportion to their bodily weight, will also be sustained in their bodily state, increase, or fall off in equal proportion?*

Two divisions were set apart—No. 5 and No. 6, each of which contained *four* two and a half year old sheep, of the averages respectively, of 78 and 56 lbs. bodily weight per head; and to which the appointed fodder in hay value was given, half in clover hay and the other half in potatoes.

The *fifth* division received $\frac{1}{30}$ of bodily weight in hay value; its weight was 340 lbs. 20 loth, therefore 10 lbs. 6 loth of potatoes and 5 lbs. 8 loth of clover hay, or 2 lbs. 20 loth of hay value per head.

	lbs.	loth.
The animals consumed in 148 days, in hay value,..........	1542	16
Their weight at the close of the experiment including wool was,	331	14
Therefore the *increase* of bodily weight exclusive of wool was,	8	30
And on 10 lbs. of production fodder,....................		$3\frac{6}{7}$
The *increase* in fine washed wool was,..................	5	8
Therefore on 10 lbs. of production fodder,..................		$2\frac{1}{5}$

The *sixth division* received also $\frac{1}{30}$ of bodily weight in hay value, weight 224 lbs. 18 loth; therefore 7 lbs. 16 loth of potatoes and 3 lbs. 24 loth of clover hay or 1 lb. 28 loth hay value per head.

	lbs.	loth.
The animals consumed in 148, days in hay value,..........	1102	16
Weight at the close of the experiment including wool,......	224	15
Therefore *decrease* of bodily weight, exclusive of wool,.....	5	8
And decrease on 10 lbs. of production fodder,................		3
The *increase* in clean washed wool,......................	4	1
Therefore on 10 lbs. of production fodder,..................		$2\frac{1}{3}$

In these two divisions too, there was a decided falling off of weight in January, as well as in April, there was exhibited an interruption in their nutrition.

The foregoing experiment thus answered the question proposed, that grown sheep of heavy and the same kind of lighter weight, do not maintain a state of the body in like proportions when fed with fodder of equal proportion, for although both divisions received as fodder $\frac{1}{30}$ of the bodily weight hay value, yet No. 5 gained on 10 lbs. of production fodder $3\frac{6}{9}$ loth; and No. 6 lost on 10 lbs., 3 loth in weight of flesh; while in No. 5 the *increase* of clean washed wool was $2\frac{1}{2}$ loth; in No. 6 it was $2\frac{1}{3}$ loth on 10 lbs. of production fodder.

It hence follows therefore, that in full grown sheep wool will be produced mainly by fodder and that when the fodder necessary to the production of the wool, has been taken up from the quantity delivered out, the flesh weight is increased by the remainder. But now from a small light sheep, with a thick stand of wool on his skin, as much wool may be sheared as from a large heavier sheep with a thin stand of wool on his skin; the light one also needs for [illegible]ntenance as much fodder as the heavy one, and if the same is not given him, the falling off will be chiefly not in the wool but in the flesh weight.

Therefore it does not appear to be correct to fodder full grown sheep, which are kept for the sake of the wool product only, according to the live weight; and in the feeding of the same, we must rather adopt a determined quantity of hay value per head, which must be regulated by the wool product and bodily weight.

Thus experiment I. division 3, exhibits a quantity of fodder of 2¼ lbs. hay value, as the correct measure for this gave on 10 lbs. of production fodder 2⅝ loth increase of bodily weight; while on the other hand, in division 4, a quantity of fodder of 3 lbs. 12 loth, hay value per head gave 1⅓ loth of wool, but an increase in bodily weight of 12¾ loth on 10 lbs. of production fodder.

This shows us also how wasteful we are of our fodder and how wretchedly we depreciate it when we give our full grown sheep, which we keep for their wool product more than 2¼ and at the highest 2 lbs. hay value per head, as in winter the more fodder given lessens the value of our wool, because this makes it gross, but the flesh and fat produced by it is lost again on the summer pasture.

EXPERIMENT III.—*Whether a similar proportion is established also in young animals which are yet fully growing?*

With this experiment I also at the same time sought to determine:

1. The value as fodder of the dried leaves of trees, as this has never been established within my knowledge.

2. Besides, how the fodder for lambs introduced into the royal stock flock, superintended by me, in its results was compared to that in the before mentioned experiments.

For this experiment were selected 12 head of half year old lambs, and placed in 3 divisions, Nos. 8, 10, 11. Their average weight was 44 lbs. per head.

The *eighth division* received 1/30 of bodily weight in hay value, half in potatoes and half in clover hay; its weight was 176 lbs. 8 loth, therefore 5 lbs. 28 loth of potatoes and 2 lbs. 30 loth of clover hay, or 1 lb. 15 loth of hay value per head.

	lbs.	loth.
The animals consumed, in 148 days, in hay value,............	868	20
Their weight at the close of the experiment, including wool, was,	190	18
Therefore, the *increase* of bodily weight, exclusive of wool,....	9	21
And on 10 pounds of production fodder,....................		7½
The *increase* in clean washed wool was,....................	3	11
Therefore, on 10 pounds of production fodder,................		2⅝

The *tenth division* received, likewise, one-thirtieth of live weight in hay value, half in potatoes, and half in dried leaves of elms, linden and poplar, of which one pound of leaves, without chopping, was taken as equal to one pound of hay: its weight 176 pounds, 12 loth; therefore, 5 pounds, 28 loth of potatoes and 2 pounds, 30 loth of leaves, or 1 pound 15 loth of hay value, per head.

	lbs.	loth.
The animals consumed, in 148 days, in hay value,...........	863	20
Their weight at the close of the experiment, including wool,....	157	19
Therefore, the *decrease* of bodily weight, exclusive of wool,....	22	23
And *decrease* on 10 pounds of production fodder,...............		2

The *eleventh* division was not shut up in any particular space, but only shorn and weighed on the same day with the other experimental animals. The animals were left at liberty among other unhoused lambs, and were foddered in the same manner as they were. Their food consisted of hay, straw, potatoes, carrots, and sometimes oats; and it was weighed out to them, so that daily 2 pounds of hay value were given per head.

	lbs.	loth.
The animals consumed, in 148 days, in hay value,..........	1184	
Their live weight at the beginning, exclusive of wool, was,....	176	8
Their live weight at the close of the experiment, including wool,	216	19
Therefore, the *increase* of bodily weight, exclusive of wool,....	32	10
And on 10 pounds of production fodder,....................		$14\frac{5}{7}$
The *increase* in clean washed wool was,....................	4	13
And therefore, on 10 pounds of production fodder,............		2

By the foregoing experiment was to be determined:

1. Whether, by an equal foddering, a similar proportion existed in young animals, still in full growth, as in full grown ones? For this purpose, let the eighth division be compared with the third one, and the results obtained by the two divisions, show that in the eighth division the fodder on 10 pounds of production fodder had gained in value by $3\frac{1}{6}$ loth, as respects increase of bodily weight, more than in the third; but that, in regard to the wool production, the value of the fodder remained the same in the two divisions.

2. The fodder value of the leaves of trees was to be determined, and for this purpose let the tenth division be compared with the eighth. The former division lost, on 10 pounds of production fodder, $16\frac{1}{6}$ loth of flesh, and gave only 2 loth of wool; while the eighth division, on the same quantity of fodder, gained $7\frac{1}{2}$ loth of bodily weight, and an increase of wool $2\frac{5}{8}$ loth.

The feeding of dry leaves of trees must hence be regarded as a light substitute for the failure of hay fodder; although I cannot deny that the same, given to lambs daily, in small parcels, together with hay, potatoes and oats, have always proved to me very profitable in their influence on their health.

3. The stronger foddering of lambs, of $\frac{1}{22}$ of hay value of bodily weight, shows very favorable results, as this, on 10 pounds of production fodder, effected an increase in bodily weight of $14\frac{3}{7}$ loth, and in wool product of 2 loth; while the fourth division, on $\frac{1}{20}$ hay value of bodily weight, yielded only $1\frac{1}{3}$ loth of wool production, and an increase of $12\frac{3}{4}$ loth in bodily weight.

We must therefore give lambs a stronger amount of fodder than $\frac{1}{30}$ of their bodily weight, in order that they shall not fall back in their progress, and in order that the fodder given them may be worth more, from their higher wool production, than it is with respect to full grown animals.

When I compare the results of the foregoing experiments, with those which Herr Von Weckherlin communicated to the eighth convention at Munich, they agree in general, and it is here found, also, that $\frac{1}{60}$ hay value of the bodily weight cannot be taken, in respect to full grown sheep, as conservation fodder, but that at least $\frac{1}{45}$ hay value is requisite for them; and that this is not sufficient for smaller animals, because sheep, on account of the wool growth, cannot be foddered only according to live weight.

Finally, I may be allowed to observe, that as the first officer of the Munich convention, the councillor of state, *Von Stickaner*, on the occasion of the experiments of Herr Von Weckherlin being communicated, added that about 250 pounds of hay value, in full grown sheep, yielded 1 pound of wool. I have used the results of the foregoing experiments to determine how this proportion should be fixed, in the different quantities of fodder mentioned, and how in regard to young animals yet fully growing. I have found the following facts in the case:

Third division.—272 pounds, 2 loth in weight, $\frac{1}{30}$ hay value; therefore, $2\frac{1}{4}$ pounds per head yielded 1 pound of wool on 255 pounds hay value, and 1 pound of flesh on 154 pounds hay value.

Fourth division.—271 pounds, 19 loth in weight, $\frac{1}{20}$ hay value; therefore, 3 pounds, 12 loth per head yielded 1 pound of wool for 380 pounds hay value; and 1 pound of flesh for 40 hay value.

Eighth division.—176 pounds, 8 loth in weight, $\frac{1}{30}$ hay value; therefore, 1 pound, 15 loth per head yielded 1 pound of wool for 258 pounds hay value, and 1 pound of flesh to 89 pounds hay value.

Eleventh division.—176 pounds, 8 loth in weight, $\frac{1}{22}$ hay value; therefore, 2 pounds per head yielded 1 pound of wool for 268 pounds hay value, and 1 pound of flesh for 36 pounds hay value.

The calculations of the councillor of state, Von Stickaner, holds, therefore, very accurately with respect to sheep which are nourished proportionably, *i. e.* with $2\frac{1}{4}$ to $2\frac{1}{2}$ hay value per head; but, on the other hand, the results are wholly different in the larger amounts of fodder, and in young still growing animals.

Frankenfelde, near Berlin, Aug. 23, 1846.

Tattooed numbers.	No. of divisions. Quantity of fodder.	This is in hay value.	Bodily weight. On 30 Dec. 1846, exclusive of wool.	Bodily weight. On 28th of May, 1846, including wool.	Weight of wool. On 30th of Dec. 1845. Unwashed.	Weight of wool. On 30th of Dec. 1845. Washed.	Weight of wool. On 28th of May, 1846. Unwashed.	Weight of wool. On 28th of May, 1846. Washed.	Difference in flesh weight. Plus.	Difference in flesh weight. Minus.	Ten pounds of production fodder, gave. Weight of wool.	Ten pounds of production fodder, gave. Flesh weight. Plus.	Ten pounds of production fodder, gave. Flesh weight. Minus.
		lbs. loth	lbs. loth	lbs. loth	lbs. loth	lbs. loth	lbs. loth	lbs. loth	lbs. loth	lbs. loth	lbs. loth	lbs, loth	lbs. loth
412	1	661 16	71 12	55 11	5 16	2 15	1 19	1 8	.. ..	16 1	17 1-2	..	9 22
501			62 14	49 16	4	2 1	1 9	1 1	.. ..	12 30			
442	1-60		69 00	45 24	3 22	1 31	1 20	1 7	.. ..	23 8			
436			68 18	45 16	4 13	2 2	1 1	28	.. ..	23 2			
Amount.		661 16	271 12	196 3	17 19	8 17	5 17	4 12	.. ..	75 9⅝	17 1-2	..	9 3
529	2	891 6	68 18	59 22	3 22	1 19	1 8	28	.. ..	8 28	4 8-9	..	1 18
602			64 16	58 9	3 22	1 21	1 22	1 4	.. ..	6 7			
577	1-45		66 24	52 16	3 26	1 31	1 20	1 3	.. ..	14 8			
463			72 8	65 11	3 5	1 24	1 11	29	.. ..	6 29			
Amount.		891 6	272 2	235 26	14 11	6 31	5 29	4	.. ..	36 8	4 8-9	..	1 18
540	3	1332 6	65 24	65 3	3 23	1 23	1 31	1 12	.. ..	.. 2	2 5-8	4 1-3	..
581			66 8	68 2	3 25	1 31	1 32	1 8	1 26	.. ..			
582	1-10		72 26	78 21	4 3	2	2 7	1 10	5 27	.. ..			
463			67 8	76 20	3 25	2	1 28	1 9	9 12	.. ..			
Amount.		1332 6			15 12	7 22	7 24	5 7	16 12	.. ..	2 5-8	4 1-3	
472	4	1995 20	66 7	82 16	4 28	1 29	2 10	1 13	16 9	.. ..	1 1-3	12 3-4	..
462			72 4	88	5	2 4	2 12	1 12	15 28	.. ..			
491	1-20		70	87 18	3 22	1 22	2	1 9	17 18	.. ..			
424			63 8	71 25	3 29	1 28	1 30	1 6	8 17	.. ..			
Amount.		1995 20	271 19	329 27	17 15	7 19	8 20	5 8	58 8	.. ..	1 1-3	12 3-4	
417	5	1542 16	78 16	73 10	4	1 22	2 1	1 4	.. ..	5 6	2 1-3	3 6-7	..
418			81 4	91	4 6	2 3	2 4	1 16	9 28	.. ..			
514	1-30		75 16	73 20	3 26	1 29	1 15	1 1	.. ..	1 28			
486			79 16	93 16	3 20	2 6	1 8	1 15	14	.. ..			
Amount.		1542 16	314 20	331 14	15 20	7 28	7 28	5 4	16 26	.. ..	2 1-3	3 6-7	

Table—Continued.

		lbs. loth	lbs. loth	lbs. loth	lbs. loth	lbs. loth	lbs. loth	lbs. loth	lbs. loth	lbs. loth	lbs. loth	lbs. loth	lbs. loth
484	6	1102 6	58 8	58 14	2 26	1 12	1 13	1 2	6	.. ..	2 1-3	..	3
599			57 22	54 3	2 31	1 4	1 23	1 1	.. ..	3 19			
604	1-30		52 4	50 18	3 2	1 72	1 12	26	.. ..	1 18			
503			56 16	61 12	3 17	1 20	1 21	1 4	4 28	.. ..			
Amount.		1102 6	224 18	224 15	2 12	5 11	6 5	4 1	.. ..	3	2 1-3	..	3

Half year old Lambs.

2	8	863 20	40 22	41 28	1 14	1 1	. 30	. 22	1 6	.. ..	2 5-8	7 1-2	
11			52 ..	56 20	1 17	1 .	1 9	. 28	4 20	.. ..			
12	1-30		47 24	51 8	1 30	1 5	1 12	. 26	3 16	.. ..			
15			35 26	40 26	1 22	1 9	1 2	. 31	5 ..	.. ..			
Amount.		863 20	176 8	190 18	6 19	4 15	4 21	3 11	14 10	.. ..	2 5-8	7 1-2	
3	10	863 20	46 20	38 11	2 8	. 31	. 25	. 18	.. ..	8 9	2	..	16 1-6
6			39 16	31 6	1 14	1 ..	. 23	. 17	.. ..	8 10			
8	1-30		43 24	40 18	1 28	1 12	. 29	. 22	.. ..	3 6			
13			46 16	47 16	2 12	1 18	1 17	1 ..	1 ..	. . .			
Amount.		863 20	176 12	157 19	7 30	4 29	3 30	2 25	.. ..	18	2	..	16 1-6
5	11	1184 ..	46 24	57 30	1 20	1 ..	1 27	1 2	11 6	.. ..	2	14 5-7	
7			45 24	57 12	2 4	1 7	2 4	1 5	5 20	.. ..			
10	1-22		46 ..	58 30	1 22	1 14	1 30	1 3	12 30	.. ..			
16			37 24	48 11	1 18	1 2	2 4	1 3	10 19	.. ..			
Amount.		1184 ..	176 8	216 19	7 ..	4 23	7 33	4 13	40 11	.. ..	2	14 5-7	

Two and a half year old sheep—$2\frac{1}{4}$ lbs. hay weight—255 lbs. hay weight—1 lb. wool = 154 lbs. hay weight—1 lb. flesh—1-30 bodily weight.
do. $3\frac{3}{8}$ " " 380 " " 1 " = 40 " " 1 " 1-20 " "
Half year old lambs— $1\frac{1}{2}$ " " 258 " " 1 " = 89 " " 1 " 1-30 " "
do. 2 " " 268 " " 1 " = 36 " " 1 " 1-22 " "

ON SHEEP HUSBANDRY IN SOUTH CAROLINA.

Report on the value of Sheep Husbandry. Read to the Agricultural Society, Pendleton, South Carolina.

In obedience to your resolution, requiring your committee to "report on sheep husbandry in the south," they beg leave to say that the resolution would seem to require a more extended examination than could be embraced in a report of an ordinary length.

They will therefore confine themselves to that part of the subject which, in their estimation, will best show the applicability and value of sheep husbandry to our neighborhood and section.

Although but little attention is given by any of us, to raising sheep, and by none to preparing wool for a foreign market, yet, it will be admitted, that our native stock are healthy, growing to a fair size and produce a fair fleece from two to five pounds, even under the great neglect with which they are treated.

There is, however, one question necessary to examine and that is, whether the quality and quantity of the fleece deteriorate in our climate. The question has been very fully examined by Mr. H. S. Randall, a very intelligent and experienced wool grower in Courtland, New York. From his excellent letters, published in the Farmers' Library, (the perusal of which I take pleasure in recommending to the members of this society,) I draw the following statement:

"It is known that from Spain (north latitude 36 to 44 degrees,) all the fine woolled flocks have sprung. And that in Saxony (north latitude 50 to 51 degrees 30 minutes) the Spanish merino wool has been improved in fineness of fibre but lessened in quantity. In New York (north latitude 42 to 44 degrees,) the fineness of the Spanish merino is preserved and quantity increased. In Vermont (north latitude 43 to 45 degrees,) the fineness and quantity of the Saxony wool are preserved.

South of us, in Madison county, Mississippi, (north latitude 32 degrees, 41 minutes,) the wool of the Saxony sheep has been found to maintain its original fineness, and increased in quantity. Recent experiments in Australia (south latitude 33 degrees, 55 minutes,) show that fine woolled sheep (the merino,) preserve the quantity and improve in quality of fleece.

The exports of wool from there in 1810 was only	167 lbs.
" " " in 1833 "	3,516,869 "
" " " in 1843 "	16,226,400 "

In 1834, London price for best Spanish merino, was	67 cts.
" Australian merino,	100
" English wool	48

In England (north latitude 50 to 56 degrees,) from some cause not yet settled fine wool cannot be grown.

Near the Cape of Good Hope (south latitude, 34 minutes,) merino sheep do well, maintaining both quality and quantity of fleece with Spain.

The latitude of Pendleton is 34 degrees, 40 minutes, but counting a degree for every 200 feet altitude, would throw us some twelve degrees farther north and between the latitudes of Spain and Saxony.

So far then as latitude is concerned, experiments have been made both north and south of us, which show, that here, Spanish merino wool neither degenerates in quality nor quantity of fleece.

It is also known that rich suculent green food, generally adds length to fibre, but does not always make fine wool coarser, at least between latitude twenty-eight and fifty degrees north, nor does it make coarse wool finer. Humidity and dryness of atmosphere seem to have, as well as climate, some influence on the fibre. But as yet, the laws which govern the fleece have not been satisfactorily ascertained. It is sufficient for the present enquiry that experiments verify the operation, that in this latitude merino wool will not become coarser, nor the coarse long wool become finer, if each stock be kept pure. And as the climate is well adapted to both, the choice of stocks may very well be left to the fancy of those who try either.

We come now to test the value of sheep husbandry to this section of country. There are many methods by which this can be done. I shall, however, take the simple one of comparing the profits of this with the other pursuits of the country.

It is acknowledged in the northern states that growing wool is a good business there, and I will first give a table from Mr. Randall's letter, showing the profits of growing wool in New York:

A. buys 100 ewes at $2,	$200 00
" 33$\frac{1}{3}$ acres of land at $20	607 00
Cutting and curing 11 acres of the above for hay,	13 65
Pay for shearing,	4 00
For salt, tar and summer care,	4 00
For labor of winter feeding,	5 00
Loss by death 2 per cent. above pulled wool from those that die,	4 00
	$837 75

Receipts.

300 pounds wool at 39$\frac{4}{7}$	118 71	
80 lambs at $1	80 00	
Summer manure equal to winter care,	5 00	
		203 71

This is equal to twenty-four per cent. on the amount invested, and makes the cost of the wool to the farmer twenty-seven cents per pound. A calculation founded on the same data for Pendleton makes the result more favorable.

A. buys 100 ewes at $1,	$100 00
Pays for shearing,	4 00
For salt, tar,	2 00
Loss 2 per cent above skins and wool of those that die	2 00
I make no charge for summer pasture, because it costs nothing, nor should rye or barley pastures for winter be charged; the crop is reaped afterwards. But charge it at twenty cents per head,	20 00
One hand's attention an hour in the morning to turn to pasture and an hour in the evening to pen; this is one-sixth part of his time. Say his whole time is worth $72; one-sixth is	12 00
Total outlay and expense for feeding one year,	140 00

Receipts.

2 pounds wool per head is 200 pounds, at 20 cents,	$40 00	
80 lambs at $1 when one year old,	80 00	
		120 00

This is eighty-five per cent. In this instance the wool costs the farmer nothing. Deduct $90 the value of the original stock of ewes at the commencement of the next year, from $140 the total outlay, and you have $50 which the value of the lambs more than equal.

Compare it with farming or planting:

A. buys a negro for	$700 00	
Furnishes him with fifteen acres of land at $5	75 00	
Half the expenses of a horse and plough,	50 00	
For his board and clothing,	20 00	
		845 00

Receipts.

His labor, 160 barrels corn at forty cents,	64 00	
Five bags cotton at $30 a bag	150 00	
		214 00

This is equal to twenty-five per cent., certainly as much as any man in this neighborhood makes. I have purposely made this large estimate that no one can say it is under the truth.

B. buys 500 ewes and twenty buck, common stock at $1,	520 00
Employs a shepherd,	175 00
Pays twenty cents for winter feed per head	104 00
Pays for tar and salt,	20 00
B. has $7[illegible] less than A. in the outlay,	819 00

Receipts.

3 pounds wool per head is 1560 pounds at 20 cents	312 00	
80 lambs to the 100 ewes is 400 lambs at $1,	400 00	
	712 00	
Deduct for loss over skins and wool of those that die, two per cent.,	18 40	
		693 60

The outlay of A. ($890) brings him 210, equal to twenty-five per cent The outlay of B. (819) brings him 693 60, equal to eighty-five per cent.

This calculation will do for the neighborhood of Pendleton or lower down where sheep have to be fed during the winter. But for all that part of Pickens and Greenville district, extending south for twenty-six or thirty miles from the foot of the mountains, the profits would be larger. For in that belt of country, I am informed by many residents, General Garvin among them, that the *range* affords sufficient food for sheep the entire year. Even when snow is on the ground, they paw the snow away and get sustenance from the winter grass.

For that section I would alter the calculation thus:

B. buys 500 ewes and twenty bucks,	520 00
Pays for a shepherd,	175 00
" for salt and tar,	20 00
	715 00

Receipts.

1560 pounds wool at twenty cents,	$312 00	
90 lambs to the 100 ewes is 450 at $1	450 00	
	762 00	
Deduct for loss two per cent. over skins and wool of those that die,	19 00	
		743 00

Making $28 more than one hundred per cent.

But try it on a scale that every one can compare with his own experience.

B. buys three ewes and one buck for,		$4 00
He shears twelve pounds of wool at twenty cents,	2 40	
Two lambs at $1,	2 00	
		4 40

Over one hundred per cent.

These are suppositions. Take what has actually occurred in Pickens district. Mr. Stribling, as I am informed by himself, bought one ewe for $1 00

In 1846 she had three lambs,	$3 00	
Sheared two pounds wool at twenty cents,	40	
		$3 40
In 1847, same ewe had two lambs,	2 00	
Sheared again two pounds wool at twenty cents	40	
Each one of the last year's lambs had a lamb apiece,	3 00	
And sheared from the 3, six pounds wool at 20 cents,	1 40	
		6 60

This is an increase of eight in two years from one ewe, and Mr. Stribling says at this time the whole are alive. I admit this is an extraordinary case and it is only mentioned to show there are cases of actual increase far above any of those calculations made above.

If then the climate be not only adapted to fine wool, but also to the coarse—if the range which is abundant and sufficient to feed a flock the entire year; and if the above calculations are founded on data any where near correct, what more can be desired to show the applicability and value of sheep husbandry to this section.

From three very respectable wool growers, one from each of the states of Pennsylvania, New York, and Ohio, I was told the way to make a calculation on the profits of sheep husbandry in a reasonably safe way, was to put down every year one-ninth less of lambs than you have ewes, and then deduct one-tenth from the whole for deaths in that year.

Thus—say you have	100 ewes.
From one hundred deduct one-ninth, and you have	89 lambs.
	189
Then deduct one-tenth for deaths,	18
And you have	171

To start with the next year. On this basis I have taken one hundred ewes and run the calculation on for eight years. The result was:—

Wool sheared in eight years,	17,190 lbs.

The gentlemen above alluded to, say that half the wool will pay all expenses, even whan the winters require five months' feed:

Deduct then one half, 8,595, at 20 cents	$1,719
The increase amounted to 2,067 sheep, at $1	2,067
Total,	$3,786

This result, if attained, would exceed fifty per cent. compounded. They say, too, it is a safe estimate to say that the lambs of each year will pay the expenses of the whole flock for that year in Pennsylvania. They more than do it here. Allow eighty lambs to one hundred ewes, and you have from five hundred ewes, four hundred lambs; deduct one tenth for deaths, and you have three hundred and sixty at $1 00,......................$360

Charge 20 cents per head for 900 sheep, makes	$180	
" for shepherd,	150	330
Lambs over pay expenses by		$30

All these calculations are made on the supposition that sheep get a part of that regular attention which all farmers give to their other domestic animals. And to make sheep husbandry successful, it is not only necessary that this attention should be given, but every one who attempts it should know something of their diseases and the cures, and also the summer and winter management. This can be acquired only by their own, or the experience of others. Easy access can be had to the experience of northern wool growers, who are proverbial for being close observers. They say the disease called the " scours" is the principal one to which sheep are liable, produced by excess of rich green food, and cured easily by a change to dry, but if allowed to continue, is fatal.

From the introduction into the United States in 1808, of merino sheep from Spain, owners of this stock have considered it of the first importance to preserve the quality and quantity of their fleece, and if possible, to improve both. They ascertained that lambs from young and healthy sires improved, while those from old ewes fell back both in quality and quantity of fleece.

Among them it is now a settled practice not to breed from ewes over seven or eight, nor from bucks over six years old. It is very important to resort to the evidence of age the teeth afford. Their books have been particular in describing these evidences, which I will copy: " During the first year, lambs have eight small teeth in front, in the upper jaw, called nippers; at a year old, the centre two shed, and two larger teeth take their place. At two years old, the next two are lost, and supplied by two larger ones. Thus losing and being supplied by two larger ones annually, till five—then they have a full set. At eight or nine they begin to lose their nippers—two every year—and by thirteen or fourteen years old, they have lost their entire set."

It is evident that during the time ewes are losing their teeth, they become less and less able to supply themselves with food, consequently afford less and less milk for their young. Thus the degeneracy is accounted for. In Vermont, where wool is as much their staple as cotton in South Carolina, so important do they consider it not to breed from ewes after they begin to lose teeth, that although mutton is not used by the inhabitants for the table, they sell their old stock to be fed to hogs.

In most of the other northern states, their ewes at that age are kept from the bucks, and fattened for market. From their known skill in managing well what they undertake, we may safely take their usage as a guide, when it is applicable to our situation. With them grass is the entire food of their flocks—green meadows for summer pasture and hay for winter. Their winters require five months' constant feeding, during which they estimate each sheep to consume fifty cents worth of hay. All stock is then kept enclosed, and the attention to turning sheep to pasture in summer, and feeding sheep in winter, requires but little labor in addition to their other stock.

Flocks require close attention but at three times in the year—the tupping, the lambing and shearing seasons. Ewes go with lamb one hundred and twenty-five days, or five months, and they so manage as to have the lambs brought in April and May; (here February is esteemed by many a better month.) To do this, the bucks must be kept impounded, except at the time desired. From the great superiority of early lambs, this part of sheep husbandry is esteemed very important.

During lambing season, close attention is required to guard both ewe and lamb from storms and cold winds—to see that the ewe acknowledges her lamb, and to keep up the marking and altering as the lambs get between five and ten days old.

Ten days previous to shearing time they prepare for it by washing the wool on the sheep's back, that the natural oil of the wool, which is destroyed by the washing, may have time to be renewed, without which the wool feels and works harsh. The washing is done at spouts or pools, prepared for the purpose, and the other flocks are kept on clean pastures till sheared. As the proper preparation of an article for market is justly considered of the next importance to a good article, I will describe this process minutely, as practised for the northern market. The shearing is done on a clean floor, and each fleece is kept unbroken. When sheared, it is rolled outside in, until it is reduced to a lump about ten inches each way, and then tied with strings in two places. For packing the wool, a bag is used nearly as large as our cotton bags, which after sewing to a hoop at top, they hang through a hole in an upper floor, a little less in diameter than the hoop; here the fleeces are packed down by the foot, the weight of an ordinary sized man being a sufficient pressure. Thus finished, the wool is ready for a northern or European market. Manufacturers will not give full price for wool unless the fleeces are unbroken; because, before manufacturing, they consider it necessary to have each fleece divided into five qualities, which they cannot do if the wool of different fleeces are emptied together.

Different modes of summer management are followed in different countries. The one followed in Australia, as described by Mr. Randall, is not only less troublesome, but would be better suited to our mountain region. There they roam over the plains, under charge of a shepherd, in flocks of three hundred to one thousand. Every night, some two or more of these flocks are penned together, during the entire year. Breeding promiscuously from the bucks that run with the flocks, allowing three or four to the hundred ewes. At the Cape of Good Hope, he says the same practice prevails; and from both of these places the wool exported is equal, and in some instances superior in quality to the merino.

The statements here given, Mr. President, we have carefully considered, and believe to be true—and we submit them under the belief that if the importance of sheep husbandry was duly considered, especially by the districts lying north and contiguous to the mountains, much additional comfort and wealth might be added to that already delightful region.

All which is respectfully submitted. R. F. SIMPSON.

Note.—Since this report was read, I have been informed by Mr. Thomas M. Sloan, that his wool does not cost him more than five cents a pound—and by Mr. Morris, at Pickens C. H., that for care, shearing, &c., of a small flock of eight ewes, worth eight dollars, kept on Ocone mountain, he paid one half of the spring clipping, equal to three-quarters of a pound per head, and that from them he had, after paying all expenses, near eighty-one pounds of wool at thirty cents—three dollars and sixty cents, and eight lambs worth eight dollars—$11 60. And by Mr. Shepherd, a tenant on Mr. J. O. Lewis' Tamosa estate, that in 1846 he took with him from Greenville a few sheep, among which were four ewes, worth $4 00

They had four lambs, worth	$ 4 00	
Thinks he sheared three pounds per head, but say two, which is 8 pounds at 20 cts.	1 60	5 60
In 1846, from eight sheared 14 pounds wool at 20 cts.	2 80	
And had eight lambs worth	7 00	9 80
		$15 40

Salt and shearing was the only expense. He had only offered to feed them once in the two years, and then they refused to taste corn shelled to them.

H. ANCRUM ON WOOL MATTRESSES.

Ashley, Pike county, Mo.

Wool mattresses, the best material and the only one that ought to be used for bedding for all ages and all ranks

The object of this paper is to prove that wool mattresses make the healthiest, the warmest, the most luxurious, the cheapest, and the most economical bed that can be made, and that it is superior to any other material for a bed for men, women and children, for all ages and sexes, and that man recovers much sooner from fatigue on such a bed than on any other. The human species are obliged to repair by sleep and repose the fatigues of the body, every sixteen hours at least, so that even the laborious pass more than a third of their lives in bed; the idle, fashionable and luxurious, and women, nearly half their time, and children, in health, sleep most of their time.

The Romans used to sleep in the day, and had particular rooms distinct from their bed chambers where they slept in the day, and in Italy and southern countries, that practice is still continued; therefore, it is of the utmost importance what kind of bed we lie upon, the harder the bed, in reason, the healthier we are. Wool mattresses give this hardness and firmness, at the same time yield sufficiently to the pressure of our bodies, and form an agreeable and luxurious bed, and wool does not make marks on the skin or relax as other bedding. In the old accounts of the court of England there is a charge on a journey for so many bundles of clean straw for the queen's bed; then it was said when men slept on straw with a log of wood for their pillows, they were men of iron, and now they sleep on feather beds and down pillows, they are men of straw. All great men, warriors, heroes,

&c., who have made any noise in the world have always slept on a hard bed, from Charles XII., to Napoleon.

Chemically, wool is the best for bedding, wool flannel, and all substances made of wool, keep our bodies warm; they are composed of a rare and spongy mass, the fibres of which touch each other so slightly that the heat moves slowly through their interstices, and wool retains its heat better than any other material, and does not strike so cold. People may be convinced of the impropriety of lying long in bed, by knowing that a sound man in one night of seven hours' sleep generally perspires fifty ounces avoirdupois or four pounds troy weight; we cannot wonder at that since there are above three hundred thousand millions of pores in the body of a middle sized man, and that in the last hours of sleep one perspires most; hence the impropriety and the weakness of lying too long in a soft bed and the necessity of lying on a comparative hard elastic bed, such as a wool mattress. In France wool mattresses are generally adopted, consequently you never meet with a bad bed there. I have travelled all over France and never met with a bad bed, and a very recent intelligent American traveller of great observation, mentions on his removal from England to France, that he found the French beds delicious because the beds are wool mattresses.

Mode of Making a Wool Mattress.—The first thing to constitute a good healthy bed is, that it must be absolutely flat, therefore all bedsteads should have wooden laths instead of sacking, which always gives and forms a hollow; the wool is carded by hand, and all knots and extraneous matter taken out, the great point is to make it thick enough. The best bed I slept in, in my life, had sixty pounds of wool in it, but the bed was a very large extra size; half that quantity will make a small bed, but if you wish to lie luxuriously, yet hard, do not stint the wool, that makes all this difference; it lasts forever—the covering is washed once a year; the wool is carded and a few pounds of wool added, and the bed is sweet and new. However luxuriously he may be, let any gentleman have a good wool mattress made, and let him ride forty or fifty miles and thoroughly fatigue himself, he will then know the value of such a bed. My object is also to increase the home consumption of our wool. There are twenty odd millions in the United States; say five to each family, four millions; say three beds to each family, taking the whole population twelve millions; say thirty pounds of wool to each bed, three hundred and sixty millions of pounds of wool; say thirty-four millions of sheep in the United States, say, eighty million pounds of wool; this will consume more than four years' clip of our wool. This ought to be promulgated to increase the consumption of our wool, and such wool as cannot be sold abroad. Independent of the benefit to all in their health who adopt wool mattresses on account of their cleanliness and durability, in the end, they are cheaper than any other bedding.

Flannel Manufactures of Wool—Home market for Wool, &c.—Of the necessity of all the world wearing flannel, and of the importance of the manufacture of flannel to the United States and the consumption of that kind of wool that cannot find a market abroad.

Every thing that encourages our woollen manufacture is of the greatest importance. Every thing that increases the home consumption of our wool is of national importance. Every thing that will promote the general health of our people is equally of national importance. In this changeable and rigorous climate in winter, if all the world were to wear flannel, particularly narrow-chested and delicate females, it would be of the greatest benefit to their health and save them many a fit of sickness; if this flannel, as it ought to be, is manufactured in the United States, it will not only increase our woollen manufactures but create a large home market for our wool, and such wool as cannot be sold abroad. When we consider how cheap the English sell their Welch flannel, it ought to stimulate our manufacturers; I must however observe, that I never purchased any flannel in the United States equal to the real Welch flannel, or that did not shrink, or that wore near so long as the English flannel. The English flannel has a knap on both sides, which renders it warm and soft, and it washes soft to the last. The United States flannel that I have used washes harsh, and the wear is not near so agreeable as real Welch flannel, but surely, all these difficulties can be overcome by our people, and they can make as good flannel as the best Welch flannel.

Considering the great national benefit it would be in point of health, if our people would all wear flannel next to their skin, I propose to repeat some observations of Dr. Black's, because I think they cannot be improved, which, if generally known, may induce them to adopt it.—It is well known that woollen clothes, such as flannels, worn next the skin promote insensible perspiration. May not this arise principally from the strong attraction which subsists between wool and the watery vapor which is continually issuing from the human body. That it does not depend entirely on the warmth of that covering is clear, for this one degree of warmth produced by wearing more clothing of a different kind does not produce the same effect. The perspiration of the human body being absorbed by a covering of flannel, it is immediately distributed through the whole thickness of that substance, and by this means exposed by a very large surface to be carried off by the atmosphere, and the loss of the watery vapor which the flannel sustains on the one side by evaporation being immediately restored from the other in consequence of the strong attraction between the flannel and this vapor, the pores of the skin are disencumbered, and they are continually surrounded with a dry and salubrious atmosphere. It is astonishing that the custom of wearing flannel next the skin should not have prevailed more universally, it is certain it would prevent a number of diseases, and there certainly is no greater luxury then the comfortable sensation which arises from wearing it after one is accustomed to it. It is a mistaken notion that it is too warm clothing for summer, it may be worn in the hottest climates, at all seasons of the year without the least inconvenience arising from wearing it. It is the warm bath of a perspiration confined by a linen shirt, wet with sweat, which renders the summer heats of southern climates so insupportable; but flannel promotes perspiration and favors its evaporation, and evaporation, as it is well known produces positive cold. I can vouch for the truth of every word of this. I wear the same kind of flannel all summer as I do in winter with sleeves; when I take extra exercise and perspire freely, my body and flesh is always cool and comfortable, and in part I owe it to wearing flannel that I have never had either fever or ague in this western country, which is full of it. All this may appear trivial, and sanitary rules are disregarded, but it is all of the utmost importance and to all. Say fifteen millions of our people wear flannel next their skin, and three flannel waistcoats to each, that is forty-five millions of waistcoats, at two yards each, (not enough with sleeves as they ought to be made) ninety millions of yards of flannel in waistcoats only. Old people, delicate women and children, and above all, consumptive people, ought all to wear flannel drawers as well as a flannel waistcoat; if this was adopted the great sickness that prevails in the United States, would be much diminished. Men drink spirituous liquors to increase the animal heat, and feel that glow that is called comfortable. Let them wear flannel next their skin instead and keep the body warm and the head cool.

EXPERIMENTS ON THE VARIOUS PLANTS BY LINNÆUS.

A trial respecting the indigenous plants of Sweden was made by Linnæus, and the result of his experiments was published in a paper entitled *Pan Suecus*, printed in the second volume of the Amœnitates Academicæ. It was written in Latin, and we have never met with it in an English dress, except in a magazine nearly one hundred years old, from whence we have taken some of the most interesting facts. Linnæus first conceived the design from observations made by him in his Dalecarlian journey, in which he found that his horses left untouched among other plants, meadow sweet, great wild valerian, lily of the valley, angelica, rose bay, willow herb, marsh cinquefoil, mountain crow-foot, crainsbill, globe crow-foot, yellow wolf's bane and various shrubs. Soon after his return he with many of his pupils set about the work. Above 2,300 experiments were made upon the horned cattle, goats, sheep, horses and hogs, many of which were repeated ten, and some twenty times over, with the sole view of determining what kinds of vegetables those several animals would eat, or reject. Care was taken, as far as circumstances would permit, to render the experiments as accurate as possible. The plants were all fresh gathered, not bruised in the getting, nor offered to the cattle when they were either almost famished or glutted with variety, nor yet in the spring time, when many of them greedily devour almost any vegetable they can get at, and which at another they will not touch. The plants also in many instances were offered to several individuals of the same species.

The trials were made only with the indigenous plants of Sweden. From the experiments it appeared that horned cattle would eat only 276 species, and rejected 218; goats eat of 449 kinds, and refused but 126; sheep eat of 387, and refused 141; horses eat of 262 species and refused 212. And of those which were offered to swine they eat of 72 species and refused 171.

The whole number of plants embraced in the list is 485, and they are arranged in the Linnæan orders. The figure (1) is made use of to signify that the plant was eaten by the animal. Two units (11) denote that the animal is very fond of the plants. A cypher (0) denotes the plant to have been rejected by the animal. A unit and cypher thus (10) or thus (01) denotes that the plant is sometimes used, and sometimes rejected by the animal. The horizontal stroke (—) signifies that no opportunity occurred of trying the plant upon the animal. The names of the plants both English and botanical are added, and also the natural places of growth of the plants, with occasional notes subjoined. Many of these have probably become disused and others in modern times have been substituted for them, but we have transcribed them as they are given in olden time. O. stands for oxen, G. for goats. Sh. for sheep. H. for horses, and S. for swine—in the last column c. is for *common;* v. c. for *very common;* n. c. for *not common;* m. p. for *moist places;* b. f. for *borders of fields;* e. w. for *every where.* The word corn is used in its European acceptation for grain as wheat, rye, &c., and not as we use it for maize or Indian corn.

		O.	G	Sh	H.	S.	Habitat.
	MENANDRIA.						
1	Jointed glass wort or salt wort, *salicornia*...	1	—	1	0	1	In salt marshes.
2	Female horse tail, *limnopuce*............	0	1	0	0	0	Stagnant waters.
	DIANDRIA.						
3	Privet or prim, *ligustum*.................	1	1	1	0	—	Hedges and woods.
4	Enchanters' night shade, *circaea*...........	—	—	1	—	—	Woods and thickets.
5	Male speedwell or fluellin, *veronica*	1	1	1	1	—	Dry pastures, woods.
6	Wild germander or germander leaved, speedwell	1	1	0	0	0	Pastures, v. c.
7	Germander speedwell, or chickweed, speedwell with footstalks..................	1	1	1	1	—	On walls and dry places.
8	Ivy leaved speedwell or small henbit......	1	1	1	1	—	Corn-fields, fallow land.
9	Common brooklime, *becabunga*...........	1	1	—	1	0	Shallow waters, c.
10	Long leaved brooklime.................	1	1	1	0	—	With foregoing
11	Narrow leaved brooklime................	1	1	1	1	—	Watery places, n c.
12	Butterwort or Yorkshire sanicle, *piniguicula*	0	0	0	0	—	On bogs.
13	Common vervain verbena...............	0	0	1	0	—	Way sides and waste places.
14	Water horehound, *lycopus*..............	0	1	1	0	—	Ditches, brooks, c.
15	Vernal grass with loose yellowish spike, *anthoxanthum*	1	1	1	1	—	Meadows and pastures.
	TRIANDRIA.						
16	Great wild valerian, *valeriana*...........	0	1	1	0	0	Woods by waters.
17	Small wild valerian or marsh valerian....	—	1	1	—	—	Moist meadows, bogs.
18	Common lamb's lettuce or corn sallet, *valerianella*..............................	—	1	1	—	—	Among corn.
19	Common flag or yellow flower de luce.....	0	1	0	0	0	By waters.
20	Millet cyperus grass, *scirpus Lin*.........	1	1	1	1	0	By waters.
21	Bullrush, *scirpus*	0	1	0	—	1	In waters.
22	Club rush............................	0	1	0	1	1	In brooks, common.
23	Cotton grass, eriophorum *Lin*............	0	1	1	0	0	On bogs.
24	Small neatweed, *nardus*.................	10	1	1	1	0	Heaths, dry pastures.
25	Great reed grass with chafty heads, *phalaris*	1	1	1	1	0	By waters, c.
26	Common fox-tail grass, *alopecurus*........	10	1	1	1	10	In meadows, com.
27	Spiked flote grass	1	1	1	1	0	Watery places, v. c.
28	Millet grass, *millium*..................	1	1	1	—	—	Woods and thickets.
29	Red oat grass of the woods, *melica*........	1	1	—	1	—	Woods, dry pastures.
30	Fair panicled corn grass or bent *agrostis*...	—	1	0	1	—	Woods, meadows, com.
31	Oblong panicled *agrostis*................	—	0	—	11	—	In woods, n. c.
32	Lavender spiked grass, *aira*.............	—	1	1	1	—	Moist meadows.
33	Water millet grass....................	1	—	1	1	—	By waters.
34	Great water reed grass, *poa*............	1	—	1	1	—	By waters, v. c.
35	Common, middle, narrow leaved and greatest meadow grass....................	1	1	1	1	1	In pastures, v. c.
36	Quaking grass, *briza*..................	1	1	1	—	—	In pastures, v. c.
37	Smooth crested grass, *bynosurus*.........	—	—	1	—	—	Meadows and pastures, e. w.
38	Small mountain spiked grass with a thick short blue spike.....................	—	1	1	1	0	Barren boggy pasture
39	Rough cased panic grass................	0	1	1	1	—	Among corn.
40	Oat grass with larger smooth spikes and spare panicles........................	1	1	1	1	—	Among corn.
41	Great wild oats grass, *bromus*...........	1	1	1	1	—	About hedges, b. f.
42	Rough oat grass with more compact panicles................................	1	1	1	1	—	Dry banks, walls.
43	Flote grass, *festuca*....................	0	1	1	1	10	Brooks, watery places.
44	Dwarf precumbent oat grass............	1	1	1	1	—	In pastures.
45	Feather headed oat grass	1	1	11	1	—	Mountainous pastures.
46	Grass upon grass.......................	1	—	—	1	—	Tops of mountains.
47	Purplish headed oat grass..............	1	1	1	1	—	In pastures.
48	Knobly rooted oat grass................	1	1	1	—	—	About hedges.
49	Common reed, *arundo*.................	1	1	0	1	0	In waters.
50	Small water chickweed or blinks, *montia*..	0	—	0	0	0	Stagnated water.
	TETRANDIA.						
51	Common field scabious, *scabiosa*..........	10	1	1	1	0	About corn fields
52	Lesser field scabious..................	—	1	1	1	—	In dry pastures.
53	Scabious with bitten roots..............	1	1	1	1	0	In meadow, c.
54	Little field madder, *sherardia*............	0	11	0	1	—	On ploughed lands

		O.	G	Sh	H.	S.	Habitat.
	TETRANDRIA.						
55	Woodroofe or woodruffe, *asperula*	1	1	1	1	—	In woods.
56	Squinancy root	1	1	1	1	0	Barren hilly ground.
57	Yellow ladies bed straw	10	1	1	0	0	Dry pastures, b. f.
58	Wild madder or great bastard madder	1	1	1	1	1	Among bushes, m. p.
59	Four leaved white ladies bed straw	10	1	1	1	0	About brooks.
60	Crosswort or mug weed	1	0	1	1	0	Hedges and bushes.
61	Cleavers or goose grass, *aparine*	1	1	1	1	0	Under hedges, v. c.
62	Great plantain or waybread	0	1	1	0	1	By way sides, e. w.
63	Hoary plantain or lamb's tongue	0	1	1	0	1	With the former.
64	Rib wort or rib wort plantain	0	1	1	1	—	In pastures, e. w.
65	Common burnet, *sanguisorba*	1	1	1	1	—	Pastures abundantly.
66	The dog berry tree, *cornus*	0	1	1	1	—	Woods and hedges.
67	Spindle tree, *euonymus*	1	1	1	0	—	In hedges.
68	Ladies' mantle, *alchemilla*	10	1	1	1	0	High pastures and meadows.
69	Cinquefoil ladies' mantle	1	1	0	0	0	With the former.
70	Broad leaved pond weed, *potamogeton*	1	1	0	0	0	In waters, common.
71	Perfoliate pond weed	0	0	0	0	0	Running waters.
72	Long leaved great pond weed with pellucid leaves	0	—	0	—	0	In rivers.
73	Greater water cultraps or oak leaved pond weed	0	—	—	—	—	Shallow slow waters.
74	Common mouse ear scorpion grass, *myosotis*	0	0	0	0	0	Ditch banks, pastures.
75	Water mouse ear scorpion grass	0	1	0	—	0	About ditches, &c.
76	Common gromwell, *lithospermum*	0	1	—	0	—	Road sides, dry pastures.
77	Bastard alkanet or alkanet buglass	10	1	1	0	0	In corn fields.
78	Common hounds' tongue, *cynoglossum*	0	1	0	0	0	By roads sides.
79	Common camfry, *symphytum*	1	0	1	0	0	Damp places.
80	Small wild buglass, *lycopsis*	1	1	1	1	0	Among corn.
81	Vipers' buglass, *echium*	1	0	1	0	—	Barren pastures.
82	Common cowslips, *primula*	01	1	1	0	0	In pastures.
83	Common primrose	10	1	1	0	0	In woods, thickets.
84	Marsh trefoil or buck bean, *menyanthes*	0	1	10	0	0	Watery pits, bogs.
85	Round leaved pimpernel, *samolus*	1	1	1	0	—	Wet boggy places.
86	Common yellow willow herb, or loose stripe	1	1	10	0	0	By water sides.
87	Yellow money wort, or herb two pence, *nummularia*	1	10	1	0	—	Wet places.
88	Red pimpernel, *anagallis*	1	1	0	—	—	In corn fields.
89	Great bind weed, *convolvulus*	0	1	1	1	—	In hedges.
90	Small bind weed	1	1	1	1	0	Among corn.
91	Little bell flower or various leaved bell flower	1	1	1	1	0	About hedges.
92	Great throat wort or Canterbury bell, *campanula*	1	0	—	0	—	In woody places.
93	Giant throat wort	—	1	1	1	—	Mountainous places.
94	Common henbane, *hyoscamus*	0	01	0	0	0	Waste places about towns.
95	White mullein, *verbascum*	0	0	0	0	0	By the way sides.
96	Black mullein	0	0	10	0	1	By way sides.
97	White flowered mullein	0	0	0	0	0	By way sides.
98	Common night shade, *solanum*	0	0	0	0	0	About dung hills.
99	Woody night shade	0	1	1	0	0	In wet ground.
100	Common ivy, *hedera*	0	0	1	1	—	In hedges.
101	Common honey suckle or wood bine, *lonicera*.	1	1	1	0	—	In hedges, woods.
102	Buck thorn, *rhamnus*	0	1	1	1	—	Hedges, thickets.
103	Black alder, *frangula*	0	11	1	—	—	In woods.
104	Common *English* mercury, *chenopodium*	0	10	1	10	0	In waste places.
105	Triangular dentated leaved blite with long erect spikes	0	1	1	0	—	Dung hills, public ways.
106	Goose foot or sow bane	1	1	1	0	1	Dung hills, abundantly.
107	Common wild oracle	1	1	1	0	11	In waste ground.
108	Cluster blite with undivided leaves	—	1	1	—	1	With the former.
109	Upright blite or all seed	1	0	1	0	—	Cultivated places.
110	Stinking oracle	1	1	1	1	0	Dry waste places.
111	The common elm, *ulmus*	11	1	11	1	1	In hedges.
112	Little centaury, *centurium*	10	—	—	—	—	Mount. dry pastures.
113	Marsh pennywort, *hydrocotyle*	—	—	—	—	—	Boggy pastures, c.

		O.	G	Sh	H.	S.	Habitat.
	TETRANDRIA.						
114	Sanicle, *sanicula*	—	10	1	0	—	Woods and thickets
115	Wild carrot, *daucus*	1	1	1	1	—	In pastures, v. c.
116	Common hemlock, *conium*	0	0	1	0	—	Near towns, e. w.
117	Common cow parsnip, *heracleum*	1	1	1	10	1	Meadows, about rivers.
118	Wild angelica, *angelica*	1	1	—	0	1	In watery places.
119	Great water parsnip, *sium*	0	0	01	1	1	About rivers, &c.
120	Common water drop wort, *oenanthe*	0	—	0	0	—	Moist meadows, c.
121	Hemlock drop wort	0	—	0	0	—	Rivers and brooks.
122	Water hemlock, *phellandrium*	1	1	1	1	01	Slow muddy waters.
123	Long leaved water hemlock, *cicuta*	0	1	1	1	—	Watery places.
124	Lesser hemlock, *ethusa*	1	1	1	1	1	Banks, gardens.
125	Small hemlock chervil with rough seeds, *scandix*	1	1	1	—	—	Hedges, waste places.
126	Wild cicily cow weed, wild chervil, *chaerophillum*	10	10	10	10	0	Under hedges.
127	Wild chervil, wild *myrrhis*	—	—	—	—	—	About hedges.
128	Great burnet saxifrage, *pimpinella*	1	1	1	1	1	Hedges, in woods.
129	Herb gerard, goat weed or ash weed, *egopodium*	1	1	1	10	—	About hedges.
130	Common smallage, *apium*	10	1	1	0	—	About waters.
131	Water elder, *viburnum*	1	1	1	0	—	Waters, low woods.
132	Common elder, *sambucus*	0	0	0	0	—	In hedges, moist places.
133	Dwarf elder or dane wort	0	0	0	0	0	By ways, b. f.
134	Grass of parnassus, *parnassia*	0	1	10	1	0	Boggy grounds.
135	Thrift, sea gilly flower, *statice*	0	1	1	1	0	On sea coasts.
136	Purging or wild dwarf flax, *linum*	—	1	1	1	—	Dry hilly pastures
137	Common or round leaved sundew, *drosera*	—	—	—	—	—	On bogs
	HEXANDRIA.						
138	Ramson's *allium*	1	—	—	—	—	Meadows, about rivers.
139	Crow garlic	1	—	—	—	—	Pasture and among corn.
140	Lancashire bastard asphadel, *anthericum*	1	—	0	1	0	Bogs in England.
141	Dwarf bastard asphadel	—	0	0	—	—	Bogs in Scotland.
142	Lilly of the valley, *convallaria*	0	1	1	0	0	In woods.
143	Solomon's seal	0	1	1	0	0	In woods.
144	Calamus or sweet smelling flag, *acorus*	0	0	0	0	0	Stagnant waters.
145	Soft rush with a compact panicle, *juncus*	—	1	—	—	—	Wet pastures and woods
146	Common soft rush	—	1	—	1	—	In and about waters.
147	Toad grass	—	—	—	1	—	Stagnated water.
148	Least triangular seeded rush grass	1	1	1	1	—	Marshy places.
149	Common hairy wood grass	0	1	1	1	—	In woods, common.
150	Small hairy wood grass	—	1	1	1	—	Hilly pastures.
151	Barberry rush, *barberis*	1	1	1	0	0	Hedges, chalky soil.
152	Sharp pointed dock with curled leaves, *rumex*	0	0	1	0	0	Waste places, rich soil.
153	Common sorrel	1	1	1	1	1	Meadows and pastures.
154	Sheep sorrel	—	1	1	1	1	Dry brooks and pastures.
155	Arrow headed grass, *triglochin*	1	1	1	1	1	In marshes.
156	Sea spiked grass	1	1	1	1	1	In salt marshes.
157	Water plantain, *alesnia*	0	1	0	1	0	Waters, plentiful.
	OCTANDRIA.						
158	Broad leaved hairy willow herb	10	1	1	1	0	Water sides, c.
159	Greater smooth leaved willow herb	—	1	—	10	—	In woods, wet pastures.
160	Common heath, or ling, *erica*	1	10	10	1	0	Barren mountainous ground.
161	Besom heath	—	1	—	—	—	Barren mountainous ground.
162	Great bilberry bush, *vaccinium*	1	1	1	1	0	Woods and heaths.
163	Black whorts, or bilberries	0	1	10	0	—	With former, v. c.
164	Red whorts, or whortleberries	0	1	0	0	—	With the former.
165	Marsh whortleberries, or moor berries	0	1	0	0	1	On bogs.
166	Golden saxifrage, *chrysoplenium*	10	—	0	0	0	Wet shady places.
167	Perennial willow leaved arsmart	0	1	1	1	1	Stagnant waters.
168	Dead or spotted arsmart, *persicaria*	0	1	1	1	0	Watery places, c.
169	Biting arsmart, water pepper lakeweed	0	0	0	0	0	Watery places, c.
170	Common knot grass, *polygonum*	1	1	1	1	1	By way sides.
171	Black bind weed, or climbing buckwheat, *fegopyrum*	1	1	0	0	0 0	In corn fields.

		O.	G	Sh	H.	S.	Habitat.
	OCTANDRIA.						
172	Harb paris, herb truelove, or one berry,	0	1	1	0	0	In shady woods.
	ENNEANDRIA.						
173	Flowering rush, or water gladiole	0	0	0	0	0	In waters.
	DECANDRIA.						
174	Common round leaved winter green, *pyrola*	0	1	0	0	0	In woods, bogs.
175	English marsh cistus, or wild rosemary, *ledum*	0	1	0	0	0	Boggy grounds.
176	Maiden pink, *dianthus*	1	1	1	1	0	Sandy ground, n. c.
777	Deptford pink	1	—	1	—	—	Dry, sandy pasture.
178	German knot grass, or knawel *scleranthus*	0	1	—	1	—	Dry, barren pasture.
179	Common white saxifrage, *saxifraga*	0	1	0	0	0	Brooks in dry pastures.
180	Bladder campion, or white campion,	1	1	1	1	0	Among the corn.
181	Red flowered wild campion, *cucubalus*	1	1	1	1	1	Hedges, moist woods.
182	Common chickweed, *alsine*	1	0	10	1	1	Moist cultivated ground.
183	Great water chickweed	—	—	1	1	1	Watery places, c.
184	Lesser stitchwort	1	1	1	1	1	About hedges.
185	Great stitchwort	—	—	--	—	—	About hedges and woods.
186	Least chickweed, or, small branched chickweed	—	—	0	—	—	On walls and m. p.
187	Plantain leaved chickweed, *arenaria*	—	—	01	—	—	Hedges and woods.
188	Large fruited sea chickweed	0	—	—	1	—	Sea coasts.
189	Purple spurry spergula	—	0	1	—	—	Dry sandy ground.
190	Common spurry	1	1	1	1	1	Among corn.
191	Common broad leaved mouse ear chickweed or *cerastium*	0	1	1	1	—	Dry pastures.
192	Wild campion, called cockle, *agrostema*	—	1	1	1	—	Among corn.
193	Jagged flowered campion, or meadow pink, *lychnis*	—	1	1	1	—	Moist meadows.
194	Wood sorrel, oxalis	01	1	1	0	1	In woods and corn.
195	Common orpine, *sidum*	1	1	1	0	1	Shady hedges and pastures
196	White flowered blunt leaved stone crop	—	1	0	—	—	On walls and houses.
197	Wall pepper, or stone crop	0	1	0	0	0	Old walls and old houses.
	DODECANDRIA.						
198	Common spiked willow herb, *lythrum*	1	1	1	1	0	By river sides, c.
199	Common agrimony	0	1	1	0	0	Dry pastures.
200	Common house-leek, *sempervivum*	—	1	1	—	—	Walls and tops of houses.
	ICOSANDRIA.						
201	The cluster or bird's cherry, *padus*	10	1	1	0	1	Woods in north of England.
202	Black thorn, star tree, *cratægus*	—	1	1	1	—	In hedges.
203	White thorn or haw thorn	1	1	1	1	—	In hedges, e. w.
204	The quicken tree, *sorbus*	1	1	1	1	1	Mountainous woods.
205	Wild pear tree, *pyrus*	1	1	1	1	—	Woods and hedges.
206	Crabtree	1	1	1	1	—	Hedges and woods.
207	Common dropwort, *tilipendula*	1	1	1	0	1	Mountainous pastures.
208	Meadow sweet	0	11	1	0	1	Moist meadows.
209	Common briar, or dog rose, rosa	1	1	1	0	1	In hedges.
210	The burnet rose	1	1	1	0	1	Hedges and sandy soil.
211	Raspberry bush, *rubus*	01	1	1	0	1	Woods northwards.
212	Common bramble, or blackberry bush	—	1	1	—	—	Hedges and thickets.
213	Dew berry bush, or small bramble	1	1	1	0	—	In moist thickets.
214	Stone, or wild raspberry	1	1	1	0	1	Northern mountains.
215	Cloud berry	1	1	1	—	—	With the former.
216	Strawberry, *fragaria*	10	1	1	0	0	In woods.
217	Common silver wood, *potentilla*	1	1	1	1	1	Barren places.
218	Shrubby cinquefoil	1	1	1	1	0	In northern countries
219	Tormentil, or silver leaved cinquefoil	0	1	0	0	1	Dry barren pastures.
220	Common cinquefoil, or five leaved grass	1	1	1	1	—	By road sides, c.
221	Little rough cinquefoil	1	1	1	1	—	On dry pastures.
222	Common tormentil *tormentilla*,	1	1	1	0	1	Dry pastures, e. w.
223	Purple marsh cinquefoil	01	1	10	0	0	Bogs, very scarce.
224	Common aveus or herb bennet, *geum*	1	1	1	10	1	Hedges and thickets.
225	Purple aveus	01	1	1	10	10	Boggy mountainous places.
226	Mountain aveus with germander leaves	0	0	0	0	0	Ireland, sparingly.
	BOLYANDRIA.						
227	Yellow water lily, *nymphæa*	0	01	0	0	1	In waters, c.

		O.	G	Sh	H.	S.	Habitat.
	POLYANDRIA.						
228	White water lily	0	01	0	0	1	In rivers, n. c.
229	Red poppy, *papaver*	1	1	1	0	—	In corn fields.
230	Long rough headed poppy	—	1	1	0	—	In corn, b. f.
231	Greater celandine, *chelidonium*	0	0	0	0	0	In waste places.
232	Herb christopher, *actaea*	0	1	1	0	0	In woods, north.
233	Common lime tree, *tilia*	1	1	1	1	—	In the north.
234	Dwarf cistus, or little sunflower, *cistus*	—	1	1	1	0	On dry heaths.
235	Sun spurge, *euphorbia*	0	01	01	1	—	In cultivated grounds.
236	Little roundish leaved spurge, or petty spurge	0	—	—	10	—	With the former.
237	Common dyer's weed, wild weed, *reseda*	0	0	1	0	0	On waste ground.
238	Common larkspur, *delphinium*	0	1	1	10	0	Among corn.
239	Columbines, *aquilegia*	0	1	10	0	0	In woods in the north.
240	Common water aloe, or fresh water soldier, *stratiotes*	—	0	—	—	1	Waters in the fens.
241	Pasque flower, *pulsatilla*	0	1	1	0	0	Dry grounds, n. c.
242	White wood anemone, *anemone*	10	1	1	0	0	In woods.
243	Meadow rue, *thalictrum*	1	1	1	1	10	Moist meadows.
244	Great spearwort, *ranunculus*	0	0	0	1	0	Shallow water, n. c.
245	Common pilewort	1	1	1	0	—	Pastures under hedges.
246	Sweet weed crowfoot	1	1	0	0	—	Woods and thickets.
247	Small flowered water crowfoot	0	1	0	0	—	In watery places.
248	Upright meadow crowfoot	0	1	1	0	0	In pastures, e. w.
249	Common creeping crowfoot	—	—	—	1	—	Corn, in meadows.
250	Round rooted crowfoot	0	—	—	—	—	Corn, in pastures.
251	Various leaved crowfoot, and fine leaved water crowfoot	0	0	0	0	0	In shallow waters.
252	Common marsh marygold, *caltha*	0	1	1	0	0	In watery meadows.
253	Globe flower, or lockergowtors, *trollius*	0	1	1	0	1	Pastures in the north.
	DYDNAMIA.						
254	Bugle, *ajuga*	10	1	1	0	0	Woods, moist meadows.
255	Scordium water Germany	0	1	1	0	0	Isle of Ely, v. c.
256	Common mother of thyme, *thymus*	—	1	1	—	0	Forests and heath.
257	Wild basil, *acinos*	10	0	10	1	—	Dry chalky places.
258	Great wild basil *clinopodium*	—	1	1	0	—	About hedges.
259	Wild majoram, *origanum*	0	1	1	1	—	Hedges and bushes.
260	Hairy verticillate water mint, *mentha*	0	1	01	1	0	About waters, c.
261	Water mint	—	—	—	1	0	About brooks.
262	Common ground ivy, *glechoma*	0	0	1	0	0	Hedges and banks.
262	Stinking horehound, *balotta*	0	0	0	0	—	About hedges.
264	White horehound, *marrubium*	0	0	0	0	—	Way sides and dry pastures.
265	Cat mint, *nepeta*	0	0	1	0	0	By way sides.
266	Wood betony, *betonica*	—	0	1	—	—	Woods and thickets.
267	Hedge nettle stachys	0	1	1	0	0	Under hedges, c.
268	Clown's allheal	0	0	1	0	0	Rivers and damp places.
269	Hemp leaved dead nettle, *galeopsis*	0	1	1	0	0	Corn and dug ground.
270	Narrow leaved allheal, or ironwort	1	1	1	0	—	In corn fields.
271	White dead nettle, *lamium*	10	1	1	0	0	Under hedges, e. w.
272	Red dead nettle	0	1	1	1	—	Hedges and gardens.
273	Great hen bit	—	1	1	1	—	On ground, dug.
274	Motherwort, *cardiaca*	01	1	1	1	0	On waste grounds.
275	Common self heal, *brunella*	1	1	1	10	—	Meadows and pastures.
276	Common cassidar, hooded willow herb, *scutellaria*	0	1	1	0	1	By waters.
277	Common toad flax, *linaria*	0	10	01	0	0	On dry banks.
278	Common small snap dragon	1	0	1	0	01	Corn fields and sandy soil.
279	Common yellow rattle, *rhinanthus*	10	1	1	10	—	Barren pastures c.
280	Red rattle, *pedicularis*	0	—	—	—	0	On damp heaths.
281	Great marsh red rattle	0	1	0	0	01	Marshy places.
282	Crested cow wheat, *melampyrum*	1	1	1	—	—	In woods.
283	Purple headed cow wheat	1	1	1	—	—	Corn fields, very scarce.
284	Common cow wheat	11	1	1	0	0	In woods, c.
285	Common eye bright, *euphrasia*	1	1	1	1	0	Hilly pastures.
286	Purple eye bright, or eye bright cow wheat	1	1	1	1	—	Corn fields and dry pastures.
287	Lathræa, or toothwort	0	1	1	0	1	Under hedges, scarce.

		O.	G.	Sh	H.	S.	Habitat.
	Dydnamia.						
288	Common figwort, *scrophularia*	0	1	0	0	0	Woods and shady places.
289	Mud weed, *plantaginella*	—	—	—	—	—	Where water stagnates in woods.
	Tetradynamia.						
290	Common whitlow grass, *draba*	10	1	1	1	0	Walls and houses.
291	Branched whitlow grass, or great shepherd's purse	—	—	—	—	—	Sides of mountains.
292	Lunar violet, with wreathen pod	10	1	—	—	—	Mountains in the north.
293	Treacle mustard, broad podded, thlaspi, *thlaspi*	1	1	0	0	1	Corn fields, waste ground.
294	Common thlaspi, or mithridate mustard	10	1	0	0	1	Among corn.
295	Common shepherd's purse	1	1	1	1	1	Waste places, e. w.
296	Common dittander, *lepidium*	1	1	1	0	—	Northern countries.
297	Narrow leaved cress	1	1	—	0	0	The sea.
298	Common scurvy grass, *cochlearia*	1	0	0	0	—	Sea coasts.
299	Common horse radish	0	0	0	0	0	North of England.
300	Common myagrum gold of pleasure, *myagrum*	1	1	1	1	—	In corn fields.
301	Common wood, *isatis*	1	0	0	0	—	Cultivated for use.
302	Jagged leaved turritis, or tower mustard, *turritis*	0	—	—	—	—	Walls and dry ditches.
303	Perfoliate cabbage, brassica	1	1	1	0	1	In corn fields.
304	Wild navew; *napus*	1	1	—	—	1	Ditch banks.
305	Charlock, or wild mustard, *sinapis*	1	1	1	10	1	Corn fields, abundant
306	Serrated leaved water radish, *sisymbrium*	1	01	01	—	—	Sides of ditches.
307	Perinated leaved water radish	1	—	1	1	1	In waters.
308	Flixweed	1	01	1	10	0	In waste places.
309	Hedge mustard, *erysimum*	0	1	1	0	0	Dry banks, v. c.
310	Treacle wormseed	1	1	1	1	1	In few countries
311	Commom water cresses, or rocket, *barbarea*	1	10	10	0	0	Ditches, brooks.
312	Jack by the hedge, *alliaria*	1	1	0	0	0	Under hedges
313	Common lady smock, or cuckow flower, *cardamine*	10	1	1	0	0	Moist meads.
314	Bitter cresses, or great flowered lady smock	10	—	1	—	—	Boggy ground.
315	Branched turritis, or codded mouse ear, *arabis*	—	—	10	—	0	On walls, dry sandy grounds.
316	White flowered raphanus, *raphanus*	—	—	—	1	—	Among corn.
317	Sea colewort, sea cabbage, *cerambe*	1	1	1	1	1	On sea coasts.
318	Sea rocket, or kale, *bunias*	—	—	—	1	—	On sea coasts.
319	Bloody crain's bill, *granium*	1	1	—	1	0	Among bushes s.
320	Mountain crowfoot, crain's bill,	1	1	1	0	1	North of England.
321	Crow foot, crain's bill	1	1	1	1	1	Pastures, about hedges.
322	Dove's foot crain's bill	0	—	1	1	0	Way sides and hedges.
323	Jagged dove's foot, crain's bill, with flowers on long foot stalks	—	1	1	—	0	Dry pastures.
324	Herb robert	—	1	0	1	0	About hedges, c.
325	Perinated leaved crain's bill, scentless	1	—	10	1	—	Ditch banks, and corn fields.
326	Common mallow, *malva*	1	—	—	1	—	Waste places, c.
327	Small, wild mallow, or white flowered mallow	01	0	11	0	0	By way sides.
328	Vervain mallow, *alcea*	1	1	1	1	—	About hedges.
	Diadelphia.						
329	Common fumitory, *fumaria*	1	10	1	0	0	Common in fields, &c.
330	Common milk wort, *polygala*	1	1	1	—	0	Mountainous pastures
331	Dyer's broom, green wood, *genista*	1	1	1	1	—	Dry pastures.
332	Wild liquorice, or liquorice vetch, *astragalus*	1	1	1	1	0	Bushes at foot of hills.
333	Yellow kidney vetch, *anthyllis*	1	1	11	—	—	Dry pastures.
334	Wood peas, or heath peas, *orobus*	1	1	1	1	—	In woods.
335	Great narrow leaved vetchling,	1	1	1	1	—	In thickets.
336	Yellow vetchling, or tare everlasting,	1	1	1	1	—	Hedges and pastures, c.
337	Variegated wild chickling, or chickling vetch, *clymenum*	1	1	1	1	—	Bushes in wet places.
338	The common tare, *vicia*	1	1	1	1	—	Sown in fields.
339	Bush vetch	1	1	1	1	1	Hedges and bushes.
340	Great tufted wood vetch, or tare	1	1	1	1	—	Woods and thickets.
341	Tufted vetches	1	1	1	1	01	Hedges and pastures.

		O.	G.	Sh	H.	S.	Habitat.
	DIADELPHIA.						
342	Smooth podded tine tare	1	1	1	1	0	Corn fields.
343	Small tine tare, *cicer*	1	1	1	1	—	Corn fields plentifully.
244	Sea peas, *pisum*	1	1	1	1	—	Sea coasts.
345	Common bird's foot trefoil, *lotus*	1	1	1	1	10	In pastures, e. w.
346	Common white trefoil, *trifolium*	1	1	1	1	0	Meadows and pastures.
347	Strawberry trefoil	1	—	—	—	—	Stagnant waters.
348	Common purple trefoil	1	1	1	1	1	Meadows and pastures, e. w.
349	Common hare's foot	1	1	—	—	—	Dry pastures, corn.
350	Common hop trefoil	1	1	1	1	—	Sandy pastures, corn.
351	The lesser hop trefoil	1	1	1	1	—	Pastures, abundant
252	Common melilot	1	1	1	1	1	Pastures, borders of fields.
353	Yellow medick with flat wreathed pods, *medicago*	1	1	1	1	—	Hilly pastures, scarce.
354	Small melilot, or melilot trefoil	1	1	1	1	1	In pastures.
355	Common prickly rest harrow, *ononis*	1	1	1	0	0	Way sides, bare pastures.
356	Purple rest harrow, without thorns	1	1	11	0	0	With the former.
	POLYADELPHIA.						
357	St. Peter's wort, *hypericum*	1	1	1	0	0	About brooks.
358	Common St. John's wort	1	1	1	0	0	Woods and thickets.
359	Tutsan St. John's wort	—	—	1	0	—	Hedges and bushes.
	SYNGENESIA.						
360	Common daudelion, *leontodon*	01	1	0	1	1	Pastures e. w.
361	Hawk weed, with bitten roots	0	1	0	1	1	Pastures, common.
362	Great flowered broad leaved hawk weed, *hypochaeris*	1	1	01	1	1	In Sussex searce.
363	Common creeping mouse ear, *hieracium*	0	1	10	0	—	Dry pastures, common.
364	Narrow leaved bush hawk weed	1	1	1	1	1	In woods.
365	Smooth yellow hawk weed, *crepis*	1	1	1	1	1	Common in pastures.
366	Tree sow thistle, *sonchus*	1	1	—	11	—	Corn fields and dry pastures.
367	Common smooth sow thistle	—	1	1	11	1	Cultivated grounds.
368	Ivy leaved sow thistle or wild lettuce	1	1	11	1	—	Shady clay lanes.
369	Common yellow goats beard, *tragopogon*	1	10	1	1	11	Meadows and pastures.
370	Common nipplewort, *lapsana*	1	0	1	1	1	On waste ground.
371	Wild succory, *cichorium*	0	1	1	0	1	Borders of corn fields.
372	Great burrdock, *arctium*	1	1	0	0	0	In waste places.
373	Common wild carline, *carlina*	0	1	—	—	—	Dry neglected pastures.
374	Cotton thistle, *onopordon*	0	—	0	0	—	Way sides, banks.
375	Spear thistle, *carduus*	01	0	0	1	0	Waste about hedges.
376	Musk thistle	10	0	0	1	—	Uncultivated field.
377	Dwarf carline thistle	0	—	—	—	—	Mountainous parts.
378	English gentle thistle	1	1	1	1	0	Marshy places.
379	Thistle upon thistle	1	1	1	1	—	Hedges and bushes.
380	Marsh thistle	—	—	—	11	—	Moist meadows.
381	Common saw-wort, *serratula*	0	1	1	10	0	Woods and pastures.
382	Common way thistle	10	1	11	1	0	Fields, hedges.
383	Water hemp agrimony with divided leaves, *bidens*	1	0	1	0	0	By ditch sides.
384	Water hemp agrimony with an undivided leaf	—	1	—	0	—	With the former.
385	Common water hemp agrimony, *eupatorium*	0	1	0	0	0	By waters, frequently.
386	Common tansy, *tanacetum*	1	0	1	0	0	Hilly ground, north.
387	Common mugwort, *artemisia*	1	10	0	1	0	Hedges and borders of fields.
388	Wild southernwood or fine leaved mugwort	—	—	0	—	—	Road sides.
389	Common wormwood, *absinthium*	1	10	1	1	0	Ditto, about villages.
390	Sea wormwood	0	0	0	1	—	On salt marshes.
391	Mountain cudweed, *gnaphilium*	0	0	1	1	1	Mountain heaths.
392	Long leaved upright cudweed	—	1	—	—	—	Sand and furze.
393	Black headed long leaved cudweed	0	0	—	—	—	Where water stagnates.
394	Common cudweed	0	0	—	—	—	Dry barren pastures.
395	The least cudweed	0	0	1	—	—	Dry sandy heaths.
396	Common coltfoot	10	1	1	0	0	Moist clay places.
397	Common butter bur	1	1	1	1	—	About brooks.
398	Common golden rod, *solidago*	1	1	1	1	1	Mountain woods.
399	Common ragwort, *senecio*	1	—	—	—	—	In pastures and road sides.

		O.	G.	Sh	H.	S.	Habitat.
	SYNGENESIA.						
400	Common groundsel	1	1	0	0	1	In cultivated ground.
401	Small starwort or blue sweet fleabane	0	0	—	—	—	On barren ground.
402	Sea Starwort, *aster*	1	1	10	1	0	In salt marshes.
403	Small fleabane, *inula*	0	0	1	0	—	Watery grounds.
404	Middle fleabane	01	0	0	—	—	Moist places.
405	Common elecampane, helenium	0	1	0	1	0	In pastures, n. c.
406	Common corn marygold, *chrysanthemum*	—	—	—	—	—	Corn, too plenty.
407	Great daisy	0	1	1	1	0	Meadows and pastures.
408	Common oxeye, *bupthalmum*	0	1	10	1	0	Moist places.
409	Sweet creeping camomile, *matricaria*	—	1	1	1	0	Damp places on heaths.
410	Common camomile	1	1	1	0	0	Among corn.
411	Stinking mayweed, *anthemis*	0	01	01	0	0	Corn fields, waste grass.
412	Great flowered camomile	1	—	1	10	—	About corn fields.
413	Common yarrow, *achillæa*	10	10	1	1	1	In pastures.
414	Common snezeewort	1	1	1	1	1	Ditch banks, marshes.
415	Common daisy	—	—	—	—	—	In pastures, e. w.
416	Great knapweed, *centaura*	0	1	1	1	1	Edge of corn fields.
417	Common knapweed	—	—	—	—	—	In pastures, e. w.
418	Common blue bottle	1	1	1	0	0	In corn fields.
419	Scabious headed rampion, *jasione*	—	—	—	—	—	Dry mounds, heath.
420	Dogs' violet, *viola*	1	1	1	0	1	Under hedges.
421	Round smooth leaved violet	1	—	10	—	—	On bogs.
422	Great hairy violet with striated flower	1	1	1	1	—	Under hedges, n. c.
423	Pansy or heart's ease	1	1	0	0	10	Corn fields.
424	Yellow impatient or touch me not, *impatiens*	0	1	0	0	—	In northern countries.
	GYNANDRIA.						
425	Male fools orchis, *orchis*	—	1	—	0	—	In pastures, c.
426	Red handed orchis, with long spurs	1	1	—	0	—	In wet pastures.
427	Male handed orchis	1	—	—	0	—	In boggy pastures.
428	Female handed orchis	10	0	1	0	—	In woods and fat pastures.
429	Frog orchis, or hand orchis, with a green flower, *satyrium*	—	1	—	—	—	In dry pastures.
430	Ladies' slipper, *cypropedium*	—	1	—	—	—	Woods in the north.
431	Common tway blade, *ophrys*	1	1	—	—	—	In woods, thickets.
432	Common grass wrack, *zostera*	01	—	—	1	1	On sea shores, e. w
	MONOECIA.						
433	Greater spiked cyperus grass, *carex*	—	1	—	1	0	In places about rivers.
434	The least prickly headed spiked cyperus grass	—	1	—	1	—	Bogs and marshes.
435	Cyperus grass with short pendulous heads.	1	1	1	—	—	In watery places.
436	Bur reed, *sparganium*	11	0	0	1	1	In and about waters.
437	The least bur reed	1	—	—	—	—	Rivers and ponds.
438	Cat-tail, *typha*	1	—	—	—	0	In waters.
439	Common nettle, *urtica*	0	0	0	0	—	In waste places.
440	The lesser nettle	0	0	0	0	—	About gardens.
441	The alder tree, *alnus*	1	1	1	1	0	Water, and wet woods.
442	The birch tree, *betula*	1	1	1	1	0	Common in woods.
443	Xanthium, called small burdock	0	1	0	1	0	In few countries.
444	Common arrow-head, *sagittaria*	01	1	—	1	1	In waters.
445	Feathered water milfoil, or pond weed, *myriophillum*	—	0	0	—	—	In waters.
446	The oak tree, *quercus*	1	1	1	1	—	Hedges and woods.
447	The beech, *fagus*	—	1	1	—	—	In woods.
448	The horn beam, *carpinus*	—	—	—	—	—	In woods
449	The hazle, *corylus*	—	1	0	—	0	Woods and hedges.
450	The common fir tree or pitch tree, *abies*	—	1	0	—	—	In Scotland.
451	Common white briony, *brionia*	0	1	0	0	0	In hedges.
	DIOECIA.						
452	Bay leaved sweet willow, *salix*	—	1	1	—	—	Rivers.
453	Round eared shining willow	—	1	—	1	—	In moist places.
454	Round leaved dwarf willow	—	1	—	1	—	On boggy heaths.
455	Round leaved sallow	1	1	1	1	—	Hedges by brooks.
456	Common white willow	1	1	1	1	—	By waters, c.
457	The osier	1	1	1	1	—	About waters.
458	Sea buckthorn, *hippophae*	0	1	1	1	—	On sea coasts.

		O.	G.	Sh	H.	S.	Habitat.
	Dioecia.						
459	Sweet gaul, Dutch myrtle, *gale*	0	1	0	1	---	On bogs, in fens.
460	Common hop, *humulus*	1	1	1	1	1	Hedges near wet places.
461	Black bryony, *tannus*	—	—	—	0	---	Hedges and woods.
462	White poplar, *populus*	10	1	1	1	---	In moist woods.
463	Black poplar	1	1	1	1	---	Rivers, in moist places.
464	Trembling poplar	—	1	1	0	0	In woods, &c.
465	Dogs mercury, *cynocrambie*	0	1	1	---	---	Woods, under hedges.
466	Common juniper, *juniperus*	—	1	1	1	---	Heaths.
467	The yew tree, *taxus*	0	1	1	0	---	Woods and gardens.
	Polygamia.						
468	Jagged sea orach, *atriplex*	1	—	—	---	---	About sea shores.
469	Spear pointed orach	1	—	—	---	---	In cultivated ground.
470	Narrow leaved orach	1	1	1	---	1	With foregoing.
471	Sea purslain, *halimus*	1	1	1	---	---	In salt marshes.
472	Common ash tree, *fraxinus*	1	1	1	0	0	Woods and hedges.
473	Common maple, *acer*	—	—	—	1	---	Woods and hedges.
474	Black berried heath, *empetrum*	0	10	0	0	---	Boggy heaths.
	Cryptogamia.						
475	Corn horse tail, *equisetum*	0	1	10	0	---	Among corn.
476	Wood horse tail	—	1	—	11	---	Woods, moist places.
477	Great marsh horse tail	10	1	11	1	1	In watery places.
478	Lesser marsh horse tail	—	1	—	---	---	In marshes.
479	Naked horse tail	0	1	0	---	10	In marshes
480	Common female fern, *pteris*	0	01	0	0	0	Barren pastures.
481	Common male fern, *filix*	0	1	0	---	---	Woods, shady hedges.
482	Common polypody	—	01	0	---	---	On old walls.
483	English maiden hair	0	—	0	---	0	Moist shady rocks.

Notes on the foregoing table.

No. 12. This plant is a certain indication of a boggy soil. It has long had the reputation of being noxious to sheep, and to give them the rot when eaten.

15. Very fragrant, and to it, fine hay owes much of its sweet smell.

19. This plant remains untouched by all, except the goat, though every herb around be entirely consumed.

21. In a scarcity of hay, the peasants of Sweden, fodder their horses with bullrushes, which, however, they do not otherwise eat. Swine are fond of the roots of this bull, and of No. 22, when green, but will not touch them when dried.

25. Horned cattle are very fond of this grass, and the peasants in the south of Sweden mow two crops a year for their use.

31. Horses are very fond of this grass, while goats will almost starve rather than eat it.

35. These form the greatest portion of fertile pastures.

45. This is the peculiar delight of sheep, and they will select it with the greatest care, says Linnæus, which is confirmed by Gmelin, who tells that the Tartars, as they move about, choose, in the summer time, places where this grass abounds. It is found on dry mountainous pastures in most parts of Europe.

74, 75. The former of these is very common, and is refused by all the animals tried. The latter is sometimes eaten by sheep, but proves fatal to them.

81. The flowers of this plant are peculiarly grateful to bees.

95. Sometimes called cow's lungwort, because supposed by the common

people excellent for coughs in oxen and cows, &c.; and the Norwegians are said to use it successfully for the same purpose.

103. Linnæus says the bark of this tree is a certain cathartic for horned cattle, in case of obstinate constipation of the bowels.

104. The root of this plant is given to sheep in obstinate coughs, in some parts of Sweden.

106. Said to be poisonous to swine—hence its name, sow bane.

113. Called also, *white rot*, because supposed to affect sheep in this way.

117. Rabbits and cows are said to be peculiarly fond of this plant.

121. The root of this plant, a most virulent poison.

122. Linnæus says that this plant is extremely hurtful to horses, and produces paraplegia, but has no bad effect on cows when eaten.

124. Geese will eat this plant, and are poisoned by it.

137. Called red rot, because destructive to sheep. The liver and lungs, greatly affected by it when they eat it.

138. Very noxious to sheep, when for want of better pasture, they are forced to eat it.

149. Considered to be very hurtful to sheep.

155, 156. Cows are extremely fond of these plants

160. Bees are supposed to collect more honey from this plant than any other.

190. A rich food for horned cattle; deserves more notice.

199. Neither horses nor horned cattle will touch it, though they consume every thing around it.

207. Swine very fond of its roots and grub it up in the pastures—horses leave it untouched.

208. Younger horned cattle and horses will rather starve than eat this plant—goats delight in it.

217. Swine are very fond of its roots.

222. Swine will also eat the roots of this plant, and in Holland, the farmers use them for the bloody flux in cattle.

227. Hogs are very fond of the leaves and roots of this plant and will fatten on them.

233. The leaves of this tree are in some places laid up as fodder for sheep and goats. Bees get some of their finest honey from the flowers—cows will eat the leaves but it affects their milk badly.

242. Horned cattle, when removed from higher grounds into woods and woody pastures, will eat this plant, but it frequently causes the bloody flux among them.

244, 251. Not relished by horses or horned cattle, on account of the biting taste. The common creeping crow foot and upright meadow crow foot, left untouched by cattle.

252. A common error imputes the yellowness of butter to this plant, but cows will consume every thing close to the ground around it before they will touch it.

260, 261. All kinds of mint prevent the curdling of milk. This often is the cause of the difficulty in the latter end of the year that the cheese will not come.

263. A panacea in diseases of cattle with the people of Gothland.

268. The roots of this plant, eagerly sought by swine.

284. Excellent food for horned cattle, and they are very fond of it. The richness of butter, attributed to its abundance in the pastures.

324. This plant has great reputation in the bloody flux of horned cattle.

Diadelphia.—The plants of this class are very acceptable to cattle: cows and sheep refused none, and horses not more than three out of the whole number with which they were tried.

346. Wherever this plant abounds it is said to indicate a fine soil.

354. Very acceptable to sheep, though the pest of corn fields.

394. So called, from the notion among the country people, that it would aid cattle that could not chew their cud.

406. The pest of the corn fields in almost all the northern parts of Europe: so hurtful in Denmark, that they had a law, obliging farmers to rid their fields of it.

407. Horned cattle do not relish this plant, though very common.

432. The Gothlanders use it as a manure, as it is cast on their coasts in great quantities.

433. Common in marshy places, but horned cattle will not touch it.

441. Leaves of the alder, very acceptable fodder to sheep in the winter.

461. Horses will not touch this plant, though common.

464. The bark of this tree, the chief food of beavers.

465. Poisonous to man—very hurtful also to sheep, which will sometimes eat it—horses will not touch it.

467. Poisonous to horses and horned cattle.

473. Horses very fond of it.

475. Horned cattle will not touch this plant—sheep will do so under some circumstances, but it is injurious to them.

476. In some parts of Sweden, collected as food for horses, as they are extremely fond of it.

477. Mowed as fodder for cows, and is supposed to increase their milk; not as acceptable as 476, to horses.

APPENDIX No. 15.

MR. CIST ON THE HOG CROP.

The want of ready and cheap access to foreign markets, led the settlers of the western states to raising hogs and distilling whiskey, as a convenient means of taking corn, their great staple, in these shapes to market. To comprehend this subject thoroughly, a glance at the following table will be necessary:

Exports of Indian Corn from the United States for fifty seven years.

Total exports of corn and corn meal from the United States from 1791 to 1847.

Year.	Corn. bushels.	Meal. bbls.	Year.	Corn. bushels.	Meal. bbls.
1791	1,713,214	351,695	1820	533,741	146,318
1792	1,964,873	263,405	1821	607,677	131,669
1793	1,233,768	189,715	1822	509,098	148,228
1794	1,505,977	241,570	1823	749,034	141,505
1795	1,935,345	512,445	1824	779,297	172,723
1796	1,173,552	540,286	1825	869,644	187,225
1797	804,922	254,799	1826	505,381	158,652
1798	1,218,231	211,694	1827	978,664	131,041
1799	1,200,492	231,226	1828	70,492	174,639
1800	1,694,327	338,108	1829	897,666	173,775
1801	1,768,162	919,353	1830	444,109	154,301
1802	1,633,283	266,816	1831	671,312	207,604
1803	2,079,608	133,606	1832	451,230	146,710
1804	1,944,873	111,327	1833	437,174	146,673
1805	861,501	116,131	1834	303,449	149,609
1806	1,064,263	108,342	1835	755,781	166,782
1807	1,018,721	136,460	1836	124,791	140,917
1808	249,538	30,813	1837	151,276	159,435
1809	522,049	57,260	1838	172,321	171,843
1810	1,054,252	86,744	1839	162,306	165,672
1811	2,790,850	147,426	1840	574,279	206,063
1812	2,039,998	90,810	1841	535,727	232,284
1813	1,486,970	52,521	1842	600,308	209,190
1814	61,284	26,438	1843	672,608	174,252
1815	830,556	72,634	1844	825,282	247,882
1816	1,077,614	89,119	1845	840,184	269,030
1817	387,454	106,763	1846	1,826,068	298,790
1818	1,079,190	120,021	1847	17,272,815	945,035
1819	1,086,762	135,271			

This table is published in this connection to show how small a proportion of the crop of this, the most important of all our cereal products, finds its way in the shape of grain and meal to foreign countries. This will be rendered apparent by the returns of the corn crop of the United States. This was by the census of 1840, 377,531,857 bushels. The patent office report estimates the crop of 1845, at 450,000,000 bushels.

The crop of 1846, as far as can be ascertained appears to have exceeded 500,000,000 bushels. The present crop—1847, is not yet gathered, but from the extent of ground cultivated in this article, the present year under the late stimulus of high prices and a demand limited only by the means of getting it to our seaports, and with the advantage of weather uncommonly favorable alike to its growth and ripening, not less than 700,000,000 bushels may be expected as the yield of the United States for the present year. The corn raised in reference to the whiskey market is independent of that which is fed to hogs, no price that can be paid by the distillers affording adequate remuneration to growers of corn who have to transport it far by land carriage.

Cincinnati being the business centre of an immense corn growing and hog raising region, is in fact the principal pork market in the United States, and without even the exceptions of Cork or Belfast, Ireland, the largest in the world.

The business of putting up pork here for distant markets, is of some twenty-six years' standing, but it is only since 1833, that it has sprung into much importance.

The following table furnishes a list of hogs put up each year since, including that of 1833, and the prices at which the market opened. The season begins in November and ends in March. Each year refers to that in which business closed.

Table—A.

Year.	No. of Hogs.	Price.
1833	85,000	
1834	123,000	
1835	162,000	
1836	123,000	$6 *a* 6¼
1837	103,000	6 *a* 7
1838	182,000	3½ *a* 4
1839	199,000	5½ *a* 6
1840	95,000	3 *a* 3½
1841	160,000	$3 50 *a* 3 75
1842	220,000	2 00 *a* 2 50
1843	250,000	1 62 *a* 2 00
1844	240,000	2 25 *a* 2 65
1845	213,000	2 50 *a* 2 70
1846	287,000	4 00 *a* 4 25
1847	250,000	2 70 *a* 2 80

Table—B

The hogs packed in Ohio in	
1844 were	560,000
1845 "	450,000
1846 "	425,000
1847 "	325,000
Of which aggregate Cincinnati packed in	
1844	43 per cent.
1845	47 " "
1846	68 " "
1847	70 " "

The entire packing of the west for three years may be divided as follows:

Table—C.

	1844.	1845	1846.
Missouri,	16,000	31,700	70,898
Tennessee,	16,000	1,500	42,975
Kentucky,	91,000	83,800	215,125

	1844.	1845.	1846.
Illinois,	136,709	67,964	68,120
Indiana,	257,414	147,420	251,236
Ohio,*	560,748	445,538	420,833
Minor points,	1,200	8,850	18,675

The hogs raised for this market, are generally a cross of *Irish Grazier*, *Byfield*, *Berkshire*, *Russia and China*, in such proportions as to unite the qualifications of size, tendency to fat and beauty of shape to the hams. They are driven in at the age of from eleven to eighteen months old, in general although a few reach greater ages. The hogs run in the woods until within five or six weeks of killing time, when they are turned into the corn fields to fatten. If the acorns and beach nuts are abundant they require less corn, but the flesh and fat although hardened by the corn is not as firm as when they are turned into the corn fields, in a less thriving condition during years when must as it is called is less abundant.

From the 8th to the 10th of November, the pork season begins and the hogs are sold by the farmers direct to the packers, when the quantity they own justifies it. Some of these farmers drive in one season, as high as one thousand head of hogs into their fields. From an hundred and fifty to three hundred are more common numbers, however, where less than an hundred are owned, they are bought up by drovers until a sufficient number is gathered for a drove. The hogs are driven into pens adjacent to the respective slaughter houses. As soon after the drover or farmer sells to the packer, the hogs are put into small pens where they are crowded as thick as they can stand, and a hand walks over the drove knocking them on the head successively, with a two pointed hammer adapted to the purpose. They are then dragged out by hooks into the sticking room, where there throats are cut, the blood passing through a drain or sewer below into large tanks prepared to receive it. The blood is saved to be sold together with the hoofs and hair, to the manufacturers of prussiate of potash and prussian blue. Adjacent to the sticking room, are the scalding troughs which are heated by steam. These troughs are of one thousand gallons capacity each. After being scalded the hogs are tossed by machinery on to a long bench, as many persons getting to work on a hog as can get round it. One cleans out the ear, which work must be done while the hog is reeking with steam, others pull off the bristles and hair which are thrown on the floor, others again scrape the animal. When these operations are through his hind legs are stretched open with a stick called a gambril and the hog is borne off by three men, two of whom carry the front part on their crossed hands and the other seizes the gambril by which he carries to the proper place and slings the hog to a hook which suspends him from the floor. Here the animal falls into the hands of the gutter, who tears out the insides, stripping at the rate of three hogs to the minute. The slaughter houses of Cincinnati are in the outskirts of the city, are ten in number, and fifty by one hundred and thirty feet each in extent, the frames being boarded up with moveable lattice work at the sides which is kept open to admit air in the ordinary temperature, but is shut up during the intense cold which occasionally attends the packing season, so the hogs shall not be frozen so stiff that it cannot be cut up to advantage. These establishments employ each, as high as one hundred hands selected for this business, which requires both strength and activity and always commands high wages.

Five minor points in this state not ascertained and included in this list, are supplied by estimate in table B

The slaughterers formerly got the gut fat for the whole of the labor thus described, wagoning the hogs more than a mile to the pork houses free of expense to the owners. Every year, however, enhances the value of the perquisites, such as the fat, heart, liver, &c., for food, and the hoofs, hair, &c., for manufacturing purposes. For the last two years from ten to twenty-five cents per hog have been paid as a bonus for the privilege of killing.

The hauling of hogs from the slaughter house to the packers, is itself a large business, employing fully fifty of the largest class of wagons, each loading from sixty to one hundred and ten hogs at a load.

The hogs are taken into the pork houses from the wagons and piled up in rows as high as possible. These piles are generally close to the scales. Another set of hands carry them to the scales, where they are usually weighed singly for the advantage of the draft. They are taken hence to the blocks where the head and feet are first struck off, each blow needing no repetition. The hog is then cloven into three parts, separating the ham and shoulder ends from the middle. These are again divided into single hams, shoulders, and sides. The leaf is then torn out, and every piece is distributed with the exactness and regularity of machinery, to its appropriate pile. The tender loins, usually two pounds to the hog, are sold to the manufacturers of sausages.

The hog thus cut up into shoulders, hams, and middlings, undergoes further trimming to get the first two articles in proper shape. The size of the hams and shoulders varies with their appropriate markets, and with the price of lard, which, when high, tempts the putter up of pork to trim very close, and indeed to render the entire shoulder into lard. If the pork is intended to be shipped off in bulk, or for the smoke house, it is piled up in vast masses, covered with fine salt in the proportion of fifty pounds salt to two hundred pounds weight of meat. If otherwise, the meat is packed away in barrels with coarse and fine salt in due proportions—no more of the latter being employed than the meat will require for immediate absorption, and the coarse salt remaining in the barrel to renew the pickle whose strength is withdrawn by the meat in process of time.

The different classes of cured pork, packed in barrels, are made up of the different sizes and conditions of hogs—the finest and fattest making clear and mess pork, while the residue is put up into prime pork or bacon. The inspection laws require that clear pork shall be put up of the sides with the ribs out. It takes the largest class of hogs to receive this brand. Mess pork—all sides, with two rumps to the barrel. Prime—for this pork of lighter weight will suffice. Two shoulders, two jowls, and sides enough to fill the barrel, make the contents. 200 pounds of meat is required by the inspector, but one hundred and ninety-six pounds, packed here, it is ascertained, will weigh out more than the former quantity in the eastern or southern markets.

The mess pork is used for the commercial marine and the United States navy. This last class, again, is put up somewhat differently, by specifications made out for the purpose. The prime is packed for ship use and the southern markets. The clear pork goes out to the cod and mackerel fisheries. The New Englanders, in the line of pickled pork, buy nothing short of the best.

Bulk pork is that which is intended for immediate use or for smoking. The former class is sent off in flat boats for the lower Mississippi. It forms no important element of the whole, the great mass being sent into the smoke houses, each of which will cure a hundred and seventy-five thousand to five hundred thousand pounds at a time. Here the bacon, as far as possible, is kept until it is actually wanted for shipment, when it is packed in hogsheads containing from eight to nine hundred pounds, the hams, sides and shoulders put up each by themselves. The bacon is sold to the iron manufacturing regions of Pennsylvania, Kentucky and Ohio—to the fisheries of Pennsylvania, Maryland and Virginia, and to the coast or Mississippi region above New Orleans. Large quantities are disposed of also for the consumption of the Atlantic cities. Flat boats leave here about the first of July, and they all take down more or less bacon for the coast trade.

For the purpose of farther illustrating the business I have been describing, I shall take the operations of the present season, 1847–1848, although the quantity of hogs which will be put up here cannot be ascertained with exactness for some weeks yet. There is little doubt that an estimate of four hundred and twenty thousand, by far the largest quantity ever yet put up in Cincinnati, will not be beyond the actual fact. This increase partly results from the growing importance of the city as a great hog market, for reasons which will be made apparent in a later page, but more particularly to the vast enlargement in number and improved condition of hogs throughout the west, consequent in this year's unprecedented harvest of corn. What this increase is may be inferred from the official registers of the hogs of Ohio, returned to the auditor of state as subject to taxation, being all those of and over six months in age. These were one million seven hundred and fifty thousand, being an excess of twenty-five per cent., or three hundred and fifty thousand hogs, over those of the previous year. Those of Kentucky, whence come most of our largest hogs, as well as a considerable share of our supplies in this article, will exhibit a proportionate increase, while the number in Indiana and Illinois must greatly exceed this ratio of progress.

If there be four hundred and twenty thousand hogs cut up here during the present season, the product in the manufactured article will be:—

150,000	bbls. Pork,
21,000,000	lbs. Bacon,
13,800,000	" Lard.

These are the products thus far of the pork houses' operations alone. That is to say, the articles thus referred to are put up in these establishments, from the hams, shoulders, sides, leaf lard, and a small portion of the jowls—the residue of the carcases, which are taken to the pork houses, leaving them to enter elsewhere into other departments of manufacture. The relative proportions in weight of bacon and lard rest upon probabilities. An unexpected demand and advance in price of lard would greatly reduce the disparity if not invert the proportion of these two articles. A change in the prospects of the value of pickled pork, during the progress of packing, would also reduce or increase the proportion of barrelled pork to the bacon and lard.

The lard made here is exported in packages for the Havana market, where besides being extensively used, as in the United States, for cooking, it answers the purpose to which butter is applied in this country. It is shipped to the Atlantic markets also, for local use as well as for export to England and France, either in the shape it leaves this market or in lard oil, large quantities of which are manufactured at the east.

There is one establishment here, which, besides putting up hams, &c., extensively, is engaged in extracting the grease from the rest of the hog, This will probably the present year operate upon thirty thousand hogs. It has seven large circular tanks—six of capacity to hold each fifteen thousand pounds, and one to hold six thousand pounds—all gross. These receive the entire carcase with the exception of the hams, and the mass is subjected to steam process under a pressure of seventy pounds to the square inch, the effect of which operation is to reduce the whole to one consistence, and every bone to powder. The fat is drawn off by cocks, and the residuum, a mere earthy substance, as far as made use of, is taken away for manure. Besides the hogs which reach this factory in entire carcases, the great mass of heads, ribs, back bones, tail pieces, feet, and other trimmings of the hogs, cut up at different pork houses, are subjected to the same process, in order to extract every particle of grease. This concern alone will turn out this season three million six hundred thousand pounds lard, five-sixths of which is No. 1. Nothing can surpass the purity and beauty of this lard, which is refined as well as made under steam processes. Six hundred hogs per day pass through these tanks one day with another.

I come now to the manufacture of lard oil, which is accomplished by divesting the lard of one of its constituent parts—stearine. There are probably thirty lard oil factories here on a scale of more or less importance. The largest of these, whose operations are probably more extensive than any other in the United States, has manufactured heretofore into lard oil and stearine, one hundred and forty thousand pounds monthly all the year round. The great increase of hogs for the present season will probably enlarge that business this year fifty per cent.

Eleven million pounds of lard will be run into lard oil this year, two-sevenths of which aggregate will make stearine, the residue lard oil, or in other words, twenty-four thousand barrels of lard oil, of forty to forty-two gallons each. The oil is exported to the Atlantic cities and foreign countries. Much the larger share of this is of inferior lard made of must fed and still fed hogs, and the material, to a great extent, comes from a distance, making no part of these tables. Lard oil, besides being sold for what it actually is, enters largely in the eastern cities into the adulteration of sperm oil, and in France serves to reduce the cost of olive oil. The skill of the French chemists enables them to incorporate from sixty-five to seventy per cent. of lard oil with that of the olive. The presence of lard oil can be detected, however, by a deposit of stearine, small portions of which always remain with that article, and will be found at the bottom of the bottle.

I now come to the star candles, made of the stearine expressed from the lard in the manufacture of lard oil. The stearine is subjected to hydraulic pressure, by which three-eighths of it is discharged as an impure oleine. This last is employed in the manufacture of soap. Three million pounds of stearine at least, have been made, in one year, into star candles and soap in these factories, and they are prepared to manufacture six thousand pounds candles per average day throughout the whole year. The manufacture of this year will probably approach that amount, as the present supply promises the raw material in abundance.

From the slaughterers the offal capable of producing grease goes to another description of grease extractors, where are also taken hogs dying of disease or by accident, and meat that is spoiling through unfavorable weather or want of care. The grease tried out here goes into the soap manufacture. Lard grease is computed to form eighty per cent. of all the fat used in the making of soap. Of the ordinary soap one hundred thousand pounds are made weekly, equal at four cents per pound to two hundred thousand dollars per annum. This is exclusive of the finer soaps, and of soft soap, which are probably worth twenty-five per cent. more.

Glue to an inconsiderable amount is made of the hoofs of the hogs.

At the rear of these operations comes bristle dressing for the Atlantic markets. This business employs one hundred hands, and affords a product of fifty-five thousand dollars.

Last of all is the disposition of what cannot be used for other purposes, the hair, hoofs and other offal. These are employed in the manufacture of prussiate of potash, to the product of which also contributes the cracklings or residuum left on expressing the lard. The prussiate of potash is used extensively in the print factories of New England, for coloring purposes. The blood of the hogs is manufactured into prussian blue.

A brief recapitulation of the various manufactures out of the hog at this point present:

Table—D.

150,000	barrels pork.	1,875,000	pounds star candles.
21,000,000	pounds bacon.	5,200,000	" bar soap.
13,800,000	" No. 1 lard	7,300,000	" fancy and soft soaps.
1,000,000	gallons lard oil.	50,000	" prussiate of potash.

420,000 hogs average, including seven pounds gut fat to each, eighty-four million pounds as the carcase weight when dressed. This is distributed as follows:

Table—E.

150,000 barrels pork—196 pounds net	29,400,000	lbs.
Bacon,	21,000,000	"
Number one or leaf lard,	13,800,000	"
Lard or grease run into lard oil, stearine and soap oleine,	5,000,000	"
Inferior grease for soap,	1,000,000	"
Evaporation, shrinkage, waste cracklings and offal for manure	13,800,000	"
	84,000,000	lbs.

The value of all this depends of course on the foreign demand. Last year the pork, bacon, lard, lard oil, star candles, soap, bristles, &c., exceeded six millions of dollars in value. This year it will probably reach eight millions. But for the reduced prices which a greatly increased product must create it would far exceed that value.

The buildings in which the pork is put up, are of great extent and capacity and in ever part thoroughly arranged for the business. They generally extend from street to street, so as to enable one set of operations to be carried on without interfering with another. There are thirty of these establishments besides a number of minor importance.

The stranger here during the packing and especially the forwarding season of the article, becomes bewildered in the attempt to keep up with the eye and the memory the various and successive processes he has witnessed, in following the several stages of putting the hog into its final marketable shape, and in surveying the apparently interminable rows of drays which at that period occupy the main avenues to the river in continuous lines going and returning, a mile or more in length, excluding every other use of those streets, from daylight to dark. Nor is his wonder lessened when he surveys the immense quantity of hogsheads of bacon, barrels of pork, and kegs of lard for which room cannot be found on the pork house floors, extensive as they are and which are therefore, spread over the public landing and block up every vacant space on the side walks, the public streets and even adjacent lots otherwise vacant.

It may appear remarkable, in considering the facilities for putting up pork which many other points in Illinois, Indiana, Ohio and Kentucky possess in their greater contiguity to the neighborhoods which produce the hogs and other advantages which are palpable, that so large an amount of this business is engrossed at Cincinnati. It must be observed, however, that the raw material in this business (the hog) constitutes sixty per cent. of the value when ready for sale, and being always paid for in cash, such heavy disbursements are required in large sums, and at a day's notice, that the necessary capital is not readily obtainable elsewhere in the west. Nor in an article, which in the process of curing runs great risks in sudden changes of weather, can the packer protect himself, except where there are ample means in extensive supplies of salt, and any necessary force of coopers or laborers, to put on in case of emergency or disappointment in previous arrangements. More than all, the facilities of turning to account in various manufactures, or as articles of food in a populous community, what cannot be disposed of to profit elsewhere, renders hogs to the Cincinnati packer worth at least five per cent. more than they will command at any other point in the Mississippi valley.

As a specimen of the amazing activity which characterizes all the details of packing, cutting, &c., here it may be stated, that two hands in one of our pork houses, in less than thirteen hours, cut up eight hundred and fifty hogs, averaging over two hundred pounds each, two others placing them on the blocks for the purpose. All these hogs were weighed singly on the scales, in the course of eleven hours. Another hand trimmed the hams, (seventeen hundred pieces,) in Cincinnati style, as fast as they were separated from the carcases. The hogs were thus cut up and disposed of at the rate of more than one to the minute.

The price of pickled pork in the eastern markets varies greatly, as may be seen by the following table of prices in New York, during the last twenty-four years: .

Table—F.

Average price per year.

Year.	Mess.	Pickled.	Year.	Mess.	Pickled.
1823	$13 31	$9 78	1836	$23 13	$17 65
1824	13 78	10 32	1837	21 66	15 99
1825	13 83	10 22	1838	21 97	16 59
1826	11 55	7 84	1839	19 32	15 72
1827	13 21	8 62	1840	15 07	12 96
1828	13 71	10 06	1841	11 36	9 48
1829	12 79	10 24	1842	9 27	7 23
1830	13 64	9 87	1843	10 32	9 59
1831	14 30	11 13	1844	9 28	7 39
1832	13 77	11 22	1845	12 13	9 51
1833	14 97	11 53	1846	10 50	8 78
1834	14 29	10 21	1847	15 00	12 58
1835	16 96	13 08			

Those who are congnizant to the importance of the domestic market will not be surprised to learn by the table of our exports of pork to foreign countries, the small proportion it forms to the quantity packed. The following is the export table for the last sixteen years:

Table—G.

Year.	Barrels.	Year.	Barrels.	Year.	Barrels.
1831	51,263	1837	24,583	1842	180,039
1832	83,025	1838	31,336	1843	80,310
1833	105,840	1839	41,301	1844	162,689
1834	83,691	1840	66,281	1845	161,609
1835	61,827	1841	132,390	1846	1[illegible] 422
1836	22,540				

More than three-fourths of the these exports is to British Colonies in America, and to the West India islands.

Few persons at the east can realize the size and especially the fatness to which hogs arrive in the west, under the profuse feeding they receive.

The following are specimens of hogs and lots of hogs killed in Cincinnati this season and the last.

Table—H.

Hogs.	Average weight—lbs.
7	720
5	640
22	403
52	377
50	375

Of these were nine—one litter—weighing respectively 316, 444, 454, 452 456, 516, 526, 532.

320 hogs,	325
657 "	305

Few if any of these hogs were over nineteen months old. The last lot is extraordinary—combining quantity and weight, even for the west. They were all raised in one neighborhood in Madison county, Kentucky, by Messrs. Caldwell, Campbell, Ross and Gentry, the oldest being nineteen months in age.

The value of these manufacturing operations to Cincinnati consists in the vast amount of labor they require and create and the circumstance that the great mass of that labor furnishes employment to thousands, at precisely the very season when their regular avocations cannot be pursued. Thus there are perhaps fifteen hundred coopers engaged in and outside of the city, making lard kegs, pork barrels and bacon hogsheads: the city coopers at a period when they are not needed on stock barrels and other cooperage, and the country coopers, whose main occupation is farming, during a season when the farms require no labor at their hands. Then there is another large body of hands, also agriculturists, at the proper season, engaged getting out staves and heading, and cutting hoop poles, for the same business. Vast quantities of boxes of various descriptions are made for packing bacon, for the Havanna and European markets. Lard is also packed to a great extent for export in tin cases or boxes, the making of which furnishes extensive occupation to the tin plate workers.

If we take into view farther that the slaughtering, the wagoning, the pork house labor, the rendering grease and lard oil, the stearine and soap factories, bristle dressing, and other kindred employments, supply abundant occupation to men, who in the spring, are engaged in the manufacture and hauling of bricks, quarrying and hauling stone, cellar digging and walling, brick-laying, plastering and street paving, with other employments, which in their very nature cease on the approach of winter, we can readily appreciate the importance of a business which supplies labor to the industry of probably six thousand individuals, who but for its existence would be earning little or nothing one-third of the year.

The United States census of 1840 gives 26,301,293, as the existing number of hogs of that date. The principal increase since is in the west owing to the abundance of corn there, and that quantity may be now safely enlarged to forty-five millions. This is about the number assigned to entire Europe in 1839, by McGregor, in his Commercial Dictionary, and there is probably no material increase there since, judging by the slow advance in that section of the world in productions of any kind.

The number of hogs cut up in the valley of the Mississippi will reach this year to one million five hundred thousand, of this it will be seen that twenty-eight per cent. or over one-fourth of the whole quantity is put up for market in Cincinnati alone.

APPENDIX No. 16.

LETTER OF HON. H. L. ELLSWORTH.

LAFAYETTE, Indiana, Dec. 15, 1847.

Dear Sir:—I intended to have given you a statement of the agricultural productions of this section of the country at an earlier day. I hasten, however, now to remark, that the quality of wheat is better than that of the last year, but the quantity will be much less, full one-third; many fields were winter-killed and ploughed up for corn. The corn crop is not an average one. The quantity of land planted was greater; while some fields produced a fair yield, others failed full fifty per cent. The drought of summer retarded the growth of the corn, and the early frosts prevented its coming to maturity. There will, nevertheless, in the aggregate, be a large amount for shipment. I have several hundred acres that will yield seventy-five to eighty-five bushels per acre, and this without hoeing, simply ploughing three times; indeed, on a thousand acres cultivated in one farm, a hoe was not used this summer.

The number of hogs fattened this year, in the Wabash valley is unusually great. These have consumed much corn that would otherwise have been shipped. The price of hogs last year, induced many to fatten what they could, and the market is glutted; pork weighing 200 pounds and upwards is $2, and from that to $1 50. The price at the east does not justify such a reduction in the price of last year. Money is scarce—salt and barrels also; hence packers have the command of the market, at their own prices. Some are trying up the carcase, except the hams, and will, I think, do better than to sell at $2 per hundred. Soon the rail road will be finished from Lafayette to the Ohio river, and this will enable us to obtain reasonable prices, deducting the freight.

During the summer I have been successfully raising barley and flax together.

If forty-eight quarts of barley and sixteen quarts of flax seed to the acre are sowed in the spring, both will grow well together, and ripen at the same time, and give a good yield; this crop may be cut with a scythe and stacked. After being threshed, (in a common thresher,) the flax seed is easily separated, as it passes through the sieve. I wished to try the experiment for the seed of both, but more especially to ascertain the value of the straw or stem for coarse paper; it is said that one ton of the straw or stem will make fifteen hundred pounds of paper, worth $70 per ton. I shall soon know the result, as the paper-mill is working up the materials. If a substitute for the present hard material (old ropes, &c.) can be furnished by the stem of flax, it will be a great desideratum gained. Cattle eat the straw and stem greedily.

I may justly remark, that the discovery of Mr. Bentz, in hulling grain, and thus preparing it for grinding, seems likely to produce an important benefit; three and a half bushels of wheat make a barrel of superfine flour; there are one pound, six ounces of bran in a bushel of wheat. A better and cheaper article can be procured than hitherto.

Having been informed by Mr. Bentz of the process, I tried it on buckwheat, and in five minutes obtained a beautiful article, the berry being perfectly hulled. I will not enlarge, knowing your report must be limited. I add an experiment to test the value of cooked and uncooked food, with some observations on our great staple of the west—swine, which, if you have room, may gratify strangers, and especially correspondents, to whose inquiries I cannot individually reply.

With an ardent hope for the prosperity of the Patent Office, I remain,

Yours, most respectfully,
HENRY L. ELLSWORTH.

Hon. Edmund Burke, Commissioner of Patents.
Washington City.

Experiments in Feeding, by Henry L. Ellsworth.

On the 24th of May, 1847, I purchased four hogs, of the following weights.

No. 1 weighed 131 lbs., 4 oz. }
" 2 " 150 " 4 " } both together weighing 281 lbs., 8 oz.
" 3 " 157 " 4 " }
" 4 " 120 " 4 " } both together weighing 277 lbs., 8 oz.

I fed Nos. 1 and 2, to each three and a half pounds of Indian meal cooked, making to both seven pounds per day. The food I prepared as follows: I took fourteen pounds of meal, enough for two days, wet this with cold water to prevent lumps; then put it into a five pail iron kettle (full of boiling water, stirring it well,) covered over the kettle with a tight board; let the mush stand till morning; putting up dampers, the heat of the kettle and arches makes the mass boil for a long time without wood.

On the 8th of June, fifteen days,

No. 1 weighed 149 pounds, 13 ounces, a gain of 18 pounds, 9 ounces.
" 2 " 165 " 13 " " 15 " 9 "

Both together having gained 34 pounds, 2 ounces in fifteen days, and consumed 105 pounds of meal. If pork is worth 3 cents per pound gross, the gain in the hogs, viz. 34 pounds, 2 ounces, is $1 02, equal to very nearly 1 cent per pound for the meal, viz. 56 pounds per bushel, say 55 cts. per bushel.

No. 3, as above on the 24th of May, weighed........ 157 lbs. 4 oz.
No. 4, " " " " .... 120 lbs. 4 oz.
Both together weighing.......................... 277 lbs. 8 oz.

These I fed, on 14 lbs. of corn, 7 lbs. to each, per day, with water, on the 8th of June, fifteen days.

No. 3, weighed...............179 lbs. 13 oz.—gain, 22 lbs. 9 oz.
No. 4, " ....146 lbs. " 25 lbs. 12 oz.

Both together, 48 lbs. 5 oz., in fifteen days.

Both together consumed 210 lbs. of corn, just double the quantity of meal fed to the other two. The 48 lbs. 5 oz. of pork, at three cents per lb. gross, amounts to $1 45 cents, making corn worth 38½ cents per bushel of 56 lbs. The hogs had salt, generally, in cakes, composed of ashes, three parts clay, one part saturated with salt, a most excellent mode of salting all kinds of stock. Those fed on corn drank freely of water. Those that eat much would rarely drink any. After fifteen days the food was changed for twenty days; those that previously had corn, lived on mush, and vice versa. No. 3, was much affected by the too rapid change from dry corn to mush, the stomach having been contracted by digestion, only required by the con centrated nourishment of dry corn, could not bear the sudden extension which mush gave it, each hog having about eight pounds of mush three times per day, equal to twenty-four pounds per day. Here I may remark, also, what seems almost incredible, that fourteen pounds of good corn meal, thoroughly cooked, will make ninety pounds of mush, so thick as not to run when taken out of the kettle. In the further experiment I omit No. 3, from the cause above, since being unwell, he did not gain over five pounds in twenty days. His case is added as a caution against too rapid change of diet. I proceed, therefore, with only the other three hogs, viz: Nos. 1, 2 and 4, and weighing as follows:

No. 1, weighed, on the 8th of June, 149 lbs. 13 oz.; on the 28th June, 179 lbs.—gain, 29 lbs. 3 oz.

No. 2, weighed, on the 8th of June, 165 lbs. 13 oz.; on 28th June, 189 lbs.—gain, 23 lbs. 3 oz.

Both together, having gained 52 lbs. 6 oz., in twenty days, and consumed, (at the rate of fourteen pounds per day,) 280 lbs., equal to 52 lbs. 6 oz. of pork, at three cents per pound gross, as before, which gives $1 57, equal to thirty-one cents per bushel. This gain was less than the other experiment on corn, which is accounted for by the change of diet. No. 4, weighed, on the 8th of June, 146 lbs.; on the 28th of June, 166 lbs.—gain twenty pounds; just one pound per day. He consumed seventy pounds of meal, cooked—twenty pounds of pork, at three cents per pound gross, amounts to sixty cents; making the corn ground and cooked, worth forty-eight cents per bushel.

Had not No. 4 suffered somewhat by a too rapid change of diet from corn to mush, he would, doubtless, have made the second experiment with the meal equal to the first experiment. Taking both experiments together, which is hardly fair, as the exchange from highly concentrated food to that far more expansive, is disadvantageous—more so than from expansive to concentrated, raw food is, to the cooked food, as 68 to 103, making the gain, by cooking, about fifty-five per cent. over uncooked food—or, three bushels of meal, cooked, is equal to four and a half bushels of dry, hard corn. It is generally estimated, that if corn is cut up and fed to hogs that fifteen bushels will fatten each one—that is, give one hundred pounds of flesh. If hogs, at gross weight, should be worth $3 per hundred, this would make corn worth just twenty cents per bushel. The hogs, in this case, were not confined in pens. If confined in pens, dry corn is worth thirty cents, and meal, cooked as above, is worth over fifty cents; so that there is a gain, by grinding and cooking, over feeding in the field, of one hundred and fifty per cent. The expenses, however, are to be deducted, and these depend on the price of wages, wood and milling. I am about to try Bogardus' mill, which, it is said, will, with two horses, grind three hundred bushel of corn and cob in a day.

I further design to fix the mill so that the meal will fall into a tub or vat, where the grist, (corn and cob,) can be cooked by steam, supplying the boiler and tub with water from a spring, making the mush just thin enough to run from the tub into troughs, thus avoiding all labor in drawing water or carrying the food. If one-fifth is deducted for offal, which is a fair estimate, net pork, at $3 50, per hundred, is about equal to three cents, gross; or it is, as two hundred and eighty is to three hundred.

I am about making further experiments to test the value of feeding corn on the stalk, after being cut up, and also by turning hogs into the field.

My present impression is, that the most profitable way to feed corn, all things considered, is to cut the corn as soon as it begins to turn hard; then hogs will eat corn, cob and stalk; then, too, the weather is mild, and swine will thrive much faster in September, October and November, than in December, January and February.

Where land is cheap and easily tilled, and labor dear, as in the west, it may be best to make hogs their own harvesters. Thus, prepare clover, oats, early corn and buckwheat, and let hogs eat them in succession. Rye, also, may be raised. The advantages of rye for stock has been underrated. It is a better improver of land, if fed off, than oats; its roots are thicker and grow deeper: it affords nourishment, (if sown in August,) from November until the autumn of the following year. Young, green rye has one great advantage over green wheat or green oats: the two last are apt to scour stock, while rye is more nourishing without the relaxing qualities. Some highly respectable farmers prefer rye to clover. One thing is certain, rye can be sowed upon new land successfully, when clover would fail—rye can be scattered before the last ploughing of corn; in this way, calves can be wintered cheaper than in any other manner. Hogs will thrive remarkably well on green rye, and fatten on it when ripe. Taking, therefore, all things into consideration, rye should be placed much higher than it now is, in the comparative scale of valuable fodder plants. But to return to the subject of field feeding of hogs.

I mentioned the preparation of various crops, as clover, oats, early corn and buckwheat, to be fed upon in succession by the swine. These crops will last till the ordinary field corn is ripe enough. If a moveable fence is provided to confine hogs to a small quantity, little is lost by field feeding, unless the weather is wet, when so much will be tramped in, that it is advisable to feed corn cut up and carried to a dry lot, where there is water. There is a general mistake in putting in oats too late. It is well to plough the ground in the fall, when work on the farm does not press, and then seize the first moment to harrow in the oats in the spring. If peas are added to the oats, as was practised on the North River, N. Y., when pork was the great staple there, it would be an improvement at the west.

A great error likewise has been committed in giving hogs too much age. At the west, hogs average over twenty months, thus subjecting the owner to the expense of wintering; at this age their average is net two hundred and fifty pounds. More than half the fat made is run off by labor and travel; little food is allowed in winter and less in the fall and spring, and the hogs have to work for a living. In many cases they get stinted and never recover. It may here be mentioned that pig pork is worth more for domestic use or for shipment to England and France, than pork from older hogs. Indeed a pig should be kept constantly growing and ought (and will, if properly attended) to increase one pound a day till killed, at ten or eleven months old, when he will weigh three hundred pounds if the breed is good. The doctrine that the breed is in the trough is not wholly correct—good hogs must be also fed, but there is as much (if not more) difference in hogs as cattle as to taking on fat. I have some so much inclined to fatten that it is difficult to reduce them sufficiently for breeders if they were placed even in common short pasture. Hogs to fatten best should not know what liberty is, they should have a warm dry bed—their feed at regular hours, and in sufficient quantities. As soon as the meal is over they then lie down and rest till the next feeding time comes round. Pushing hogs however only to those intended for early killing; if extraordinary weight is desired, pigs should not be confined too closely or be too highly fed for the first year; room and moderate exercise is favorable to the growth of bone and muscle. A pig that has been pampered for one year, will if taken then fall far below one of the same weight that has not been crowded if both are allowed the same diet afterwards.

I cannot omit to notice a fatal error among farmers in hazarding all by new crosses. Many of the first breeds in this and other sections of the country have been spoiled by mixtures with the Berkshire, for while a cross with the Berkshire and the Wood breed of hogs could not but improve the stock, an equal improvement has not followed in crossing the former with the improved kinds. When *a good breed has been obtained it should be kept* till there is a certainty of getting a better. Crosses often do not improve stock, the experiment should be first made with a few hogs. There is another important fact to be attended to. It is desirable to breed in and in, for one or two litters, until the breed becomes *established.* One cross may produce an improvement in the appearance of the pigs, but their progeny may partake fully of the male or female, neither of which is wanted. The great deterioration in hogs does not follow so much from breeding in and in as from injury to the male by excessive indulgence. The male should be kept up and not allowed more than one or two connections—if farmers would be particular on this point, they will have better hogs and also find that the number of boar pigs will be increased *fifty per cent.* such is the result of experiments in Europe as most fully tested.

After a full consideration of the subject I am satisfied that stock raising at the west is much more profitable than growing small grain—indeed an examination of the present circumstances in the north-western states shows a vast difference in the wealth of the graziers over those who crop with grain. The profits of wheat appear well in expectation on papers, but this prospect is blasted by a severe winter, appearance of insects, a want of harvesting, bad weather in harvesting, in threshing, for there are few barns at the west, or transporting to market, and lastly, a fluctuation of the market itself. Some one of these is likely to happen, for very fortunate is that farmer who escapes them all. There is too another very important fact to be noticed. Constant cropping of corn and small grain carried from the field will of course diminish gradually, at least, the fertility, and the farm is at length worn out. On the contrary, by feeding the crop on the land, the farm *every year grows better.* I am making several experiments with stock, but shall not be able to complete them in time for your report this year, I have now on my farm one hundred breeding sows, which are expected to produce six hundred pigs in March and April; these I design to fatten by January, 1849, spaying the old sows and killing them at the same time as the pigs, reserving one hundred young sows (also a few extraordinary old ones) to stock the farm for another year. This mode of farming enables me to gather my rent from distant farms with the least trouble and most profit, as I can notify the tenant when the rent gatherers are coming and so continuing the collection of rent, leaving the farm nearest market till the last. It may seem to eastern men incredible that such amounts of corn can be raised or purchased so cheap. It costs 2 50 to $3 per acre to hire land tilled in corn—the crop averages fifty bushels; thus making the corn in the field six cents per bushel, inclusive of rent of ground, which to a purchaser is very inconsiderable. One young man with two horses will tend easily forty acres, and raise two thousand bushels by three and a half month's labor.

I mentioned in a former letter (published in your agricultural report of 1845,) that I had six teams (five yoke of cattle to each) to break up the sod without any help but one boy to drive, the plough being fastened to a short axle, so as to graduate the depth of furrow or to keep the plough in a proper position; two boys attending upon the six teams, to drop the corn which was covered by the sod—this gave a sod crop without tending of thirty to forty bushels per acre; I wish now to say that with two stout horses I have this year broken up two acres per day of similar land, by using a steel plough, called the "Chicago Clipper." The chief advantage of it is the angle of the mould board and its smoothness. In very hard soil three horses may be required to do the work of five yoke of cattle, with the old plough. The Chicago Clipper is not a patented article and is therefore open to all. I have requested Mr. Burrel of Geneva, to improve upon it by adding his friction roller.

APPENDIX No. 17.

ON THE PROPORTIONS OF NUTRIMENT OF THE MEANS OF LIVING.

By Dr. Glaser. Translated from the German by E. Goodrich Smith.

According to a memorial presented to the French minister, 100 pounds of wheat bread on average contain 30 pounds of nutritive elements, (gluten with starch.) Black bread much less.

100 pounds of flesh on average 31 pounds of nutrition, (according to Wöhler) fresh flesh seventy-seven per cent. water, the remaining solid substance, (fibrine.)

100 pounds of French beans, on an average, contain eighty per cent. nutrition.

100 pounds of peas twenty-three per cent.

100 pounds of lentils ninety-four per cent.

(Vegetable casein and Starch.)

100 pounds of beets pulse eight per cent.

100 pounds of carrots fourteen per cent.

(Vegetable albumen with Sugar.)

100 pounds of potatoes twenty-five per cent.

Vegetable albumen, Starch and Sugar.)

According to this we disagree with many erroneous views and prejudices in reference to the effect of the most known means of food. Flesh for example is not the most nutritious food, but lentils. Farinaceous food gives more nutriment than flesh. No meal is richer in gluten, and therefore more nutritive than wheat flour. Wheat bread is also more satisfactory than black bread. The nutritive power of lentils is well known, as also that bean meal gives a very nutritious power baked with bread. To slaves and prisoners, are daily given in the east comparatively small portions of beans, by which they are perfectly supported. The whiter and finer the beans, so much the better, and the more nutritious, and so the more to be recommended to the poor. The wheat bread of the French and Americans is more sustaining than the Westphalian rye bread, and our black bread, in spite of all the inbred preferences for the same by our countrymen.

Eggs are chiefly nutritious for their albumen; the yolk contains of it 17 per cent. (together with 29 per cent. of oil and 54 per cent. of water,) and the outer white 12 to 14 per cent. of albumen, dissolved in water. Among the usual vegetables as above, potatoes are the most nutritious. But with one pound of lentils we can supply the place of three pounds of flesh; the increased culture of which would therefore well repay the trouble. Beans, too, in respect to their actual value, are reckoned much too small. The prevailing farinaceous food, indeed, on account of respiration, ought to be connected with juicy vegetable fruits. Milk, especially skim milk, deprived of its fatty parts, nourishes by means of its proportion of casein. Sweet milk is sufficient for young creatures as the single means of sustenance, for the production of all the parts of the body, and by means of its sugar to keep up perfectly the respiration. To cheese (the substance freed from the whey, containing sugar of milk,) is deficient as a supply for respiration, on which account it is properly eaten with bread and butter; otherwise it nourishes uncommonly.

Man likewise could live on mere vegetable fruit, although the formation of his teeth, consisting of cutters and grinders, indicates the mixed nature of food suitable for him. When in times of scarcity and need it comes to still hunger and to refresh the life, without regarding the good taste of the food, we ought to have a reference mainly to the diffusion and consumption of the above denoted and so effective *pod* fruits. The delusion that the drinking of beer, wine and brandy gives nourishment and strength, which induces the poor man in the midst of his necessity to give a couple of kreutzers for it, in place of procuring good white bread for his money, may still induce the conviction that a liquid with mere spirit of wine and some portion of sugar, is in the highest degree warming and exciting; but it can never nourish; for how should it do so? Beer, with its escaping proportion of gluten, cannot, therefore, be regarded as particularly nutritious; its sugar, in case of strong draughts, makes men fat indeed, while it fills up with fat but cannot add to food.

APPENDIX No. 18.

SWIFT'S CAST IRON GRAIN, COFFEE AND SPICE MILLS.

Hon. Edmund Burke, Commissioner of Patents:

Sir:—This cast iron grain, coffee and spice mill was invented, about three years since, by a Mr. Swift, of Dutchess county, New York, and is considered one of the most useful and economical machines for the farmer and planter, that has been got up for some time. The plates are of cast iron, and will generally last to grind from 500 to 1000 bushels. When worn out, new plates can be substituted, which will grind an equal quantity The grain, coffee or spice falls from the hopper among coarse teeth set on a spiral shaft, which, revolving rapidly, break it up, and then pass it between plates which can be screwed up to grind to any required fineness.

The cast iron mill is suitable for grinding rice, corn, wheat, rye, barley, oats, peas, beans, or any other kind of grain into *meal;* but it does not *flour* wheat and rye well, because it cuts the grain with its iron teeth, without *mashing* it, as when run between stones. It is also suitable for grinding spices of all kinds. The advantages of the cast iron over the stone mill are the following: 1st. Its cost is only about one-third as much. 2d. It never needs dressing. 3d. When the plates are worn out they can be supplied by new ones, at a trifling cost. 4th. It is of so light weight that it is easily transported, and can be had with or without the frame. The hand mill (Fig. 1,) can be easily transported by emigrants crossing to Oregon or the Californias, or by detachments of soldiers on a march, or by isolated travellers. 5th. It is simple in its construction, easily managed, and no liable to get out of order.

Fig. 1.

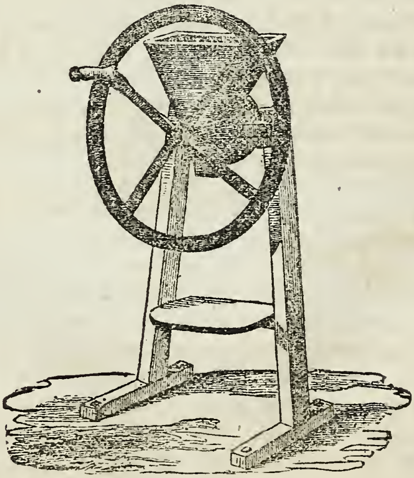


Fig 1 is used for grinding grain coffee and spices, as may be desired. It is usually operated by hand, though it can be constructed to run by other power. It grinds from one to two bushels per hour, according to the speed given. Weight, without the frame, forty-five to fifty pounds; with the frame, sixty to sixty-five pounds. Price, without the frame, $6 00; with the frame, $7 00. Constructed to move by horse or other power, the price, with frame complete, would be $9 00. Price of extra plates, $1 25 per pair. It occupies a space of two feet square and three feet high with the frame.

Fig. 2.

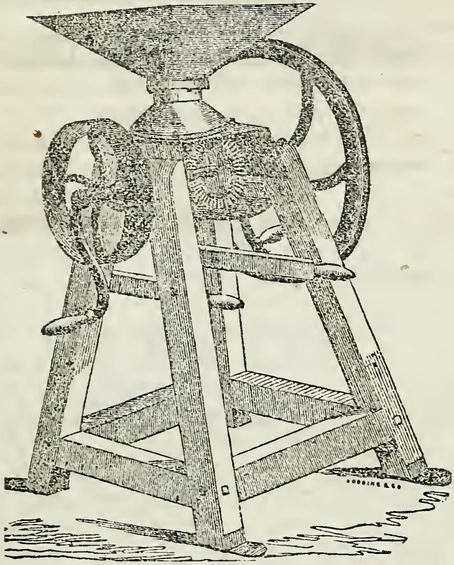


Fig. 2 is used for the same purposes as Fig. 1. It is too large to be propelled by hand to advantage, but two men may grind tolerably fast with it. Weight, without the frame, 190 pounds; with the frame, 221 pounds. Price, without the frame, $29 00; with the frame, $30 00. Price of extra plates per pair, $4 00. It occupies a space of three feet square, and three and a half feet high, with the frame.

Neither climate nor weather affects these mills. They have been so long in use now, and are so universally liked where they are known, that they may be confidently recommended to the public.

Very respectfully, your ob't servant,
A. B. ALLEN.

New York, Feb'y 1st, 1848.

The Fluke Plough for Planting Cane.

It has long been a great desideratum with the sugar planter, to get up a plough suitable for planting cane. This I think is at last attained by a recent improvement in the *fluke* plough. It is now constructed much larger than formerly, with a sharper and more elongated double mould board, and a longer, sharper point or share. Two sizes are made for the purpose of cane planting, which open a furrow, or more properly a trench, from eight to twelve inches wide, and from four to eight inches deep, as required. It is easily drawn by two mules. The price varies according to size, from $7 to $10

Figure 1.—Side View.

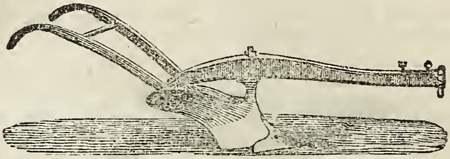
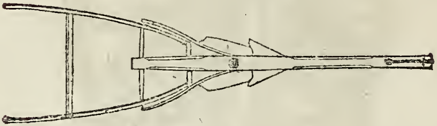


Figure 2.—Top View.



The Rice Trenching Plough.

This is made upon nearly the same principle as the above. The double mould board however is considerably lighter, lower, longer, and narrower in proportion. In trenching a field for the rice crop, it will do the work of several hands with hoes, and will be found a great labor-saving implement It is an excellent implement, also, for opening drills for corn or cotton, and various other crops. It was improved by an eminent rice planter from South Carolina. It is easily drawn by one mule. The price is $6.

The Ridging or Furrowing Plough.

This is constructed much like the fluke plough. It is smaller, however, and wider in proportion to its size. It is used for opening drills to plant potatoes, corn, &c. In ploughing out between narrow rows, it throws the dirt both ways to the plant, and thus does the work of two ploughs. It may be used for digging potatoes, opening shallow ditches, &c. It is usually drawn by one mule. The price is $3 50.

A. B. ALLEN.

New York, February, 1848.

APPENDIX No. 19.

Production of cereal grains in the United States in 1847.—Consumption and surplus for exportation.—Demands of foreign countries.—Foreign country rivals of the United States.—Products of the labor and capital of the United States in 1847.—Aggregate amount of property, real and personal, in the United States in 1847.—Miscellaneous Tables

It is proposed to submit a few facts and considerations, in as condensed a form as possible, in relation to the subjects above enumerated. Precise accuracy is not promised; the nature of the enquries not admitting of it. Approximation to the truth only is aimed at; and that, it is believed, has been attained. If we have accomplished what we have attempted, our statements and estimates will afford interesting matter for reflection not only to the agriculturist, but the economist and statesman.

I.—*Quantity of the different grains produced in the United States in 1847.*

The following is the amount of the different kinds of grain produced in the United States in 1847, according to the estimate contained in the table preceding the agricultural report of this office for the present year, viz:

Breadstuffs.	Bushels.	Total Bushels.
Indian corn or maize,........................	539,350,000	
Wheat,..	114,245,500	
Rye,...	29,222,700	
Buckwheat,....................................	11,673,500	
		694,491,700
Grain not used for breadstuffs.		
Oats,..	167,867,000	
Barley,..	5,649,950	
		173,516,950
Total..		868,008,650

Other articles of food.

Potatoes,......................................	100,950,000	bushels
Beans and Peas,..............................	50,000,000	"
Rice,..	103,640,590	pounds.

Estimated population, 20,746,400.

II.—*Amount of the grains used for food, consumed in the United States, showing surplus left for exportation.*

In estimating the domestic consumption of grains in the United States during the present year, we begin, first, with the quantity of each kind used for seed. And in relation to this item of consumption, it is proper to remark, that we have taken for the basis of our calculations, the estimates of intelligent practical agriculturists, residing in different parts of the Union, to whom we have personally applied for information. Making due allow ance for different localities, soils and climates, it is believed, they may be relied upon as very nearly accurate:

Varieties.	Whole quantity raised. Bushels.	Quantity used for seed. Bushels.	Amount after deducting seed. Bushels
Indian corn or maize,	539,350,000	6,000,000	533,350,000
Wheat,	114,245,500	11,424,550	102,820,950
Rye,	29,222,700	3,652,587	25,570,113
Buckwheat,	11,673,500	723,343	10,950,157
	694,491,700	21,800,480	672,691,220

Note.—In this estimate we have allowed a gross amount for the seed used in the cultivation of Indian corn. For wheat we have allowed in the proportion of one bushel of seed to ten bushels of grain produced. Of rye one bushel to eight; and of buckwheat one bushel to sixteen. These proportions of seed to the quantities produced are greater than those allowed by the statistical writers of France, for the crops of that country, and less than those allowed in England.

As oats are not used for human food in this country, we have not included that crop in the table above. The proportion, however, of seed to the quantity produced, is about one bushel to twenty. Thus, after deducting from the crops of the various grains used for breadstuffs in the United States, in 1847, the quantity used for seed, 672,691,220 bushels remain for the use of men and animals, and for exportation to foreign countries.

In estimating the consumption of breadstuffs, English and French writers usually allow five bushels of wheat to each individual. In this country, Indian corn enters largely into the consumption of nearly every class of the community. It is the principal food of the slave population, and is consumed in much greater proportion than wheat, by the agricultural population of the New England states. The general use, therefore, of Indian corn, in the United States, as an article of human food, very much reduces the quantity of wheat consumed.

Another cause which tends to diminish the quantity of breadstuffs consumed by the people of the United States, is, the large amount of animal food consumed by them, which can easily be obtained, and which forms a large item in the consumption of every class of the population of the Union, not excepting the slave population. Making an allowance for the use of Indian corn and animal food, it will appear, that the quantity of wheat consumed by the people of the United States is much less, in proportion, than the quantity consumed by the people of other civilized countries. We do not believe it will exceed three bushels for each individual of the whole population of the Union free and slave. As the slaves consume but very little wheat, of course, the quantity for each white person would be greater. Below is a table presenting estimates of the quantities of wheat and corn consumed by the people of the United States, based upon two ratios of calculation; first, upon the allowance of three bushels of wheat and five of corn for each individual of the whole population; and second, upon the allowance of three and a half bushels of wheat to each person, excluding the slaves.

On these bases of calculation, the table also shows the surpluses and deficiencies of each state and territory in the Union, above or below the consumption of its population.

Table exhibiting the estimated population of each state and territory of the Union in 1847, the number of bushels of wheat and Indian corn produced in each; the quantity of wheat consumed for food, allowing three bushels to each person; also the quantity consumed by the free population, allowing three and a half bushels to each person; also the quantity of Indian corn consumed by the whole population, allowing five bushels to each person; together with the deficiency and excess, under or over the quantity of each kind of grain produced in each state and territory.

States and Territories.	Proportion of whites by census of 1840.	Estimated population in 1847.	No. of bushels of wheat produced.	No. bush. of wheat consumed, allow'g 3 bush. to each per.	Excess.	Deficiency.
Maine	......	600,000	890,000	1,800,000	....	910,000
New Hampshire	......	300,000	610,000	900,000	....	290,000
Massachusetts	......	850,000	256,000	2,550,000	....	2,294,000
Rhode Island	......	130,000	4,500	390,000	....	385,500
Connecticut	......	330,000	125,000	990,000	....	865,000
Vermont	......	302,000	664,000	906,000	....	242,000
New York	......	2,780,000	14,500,000	8,340,000	6,160,000	....
New Jersey	......	416,000	1,100,000	1,248,000	....	148,000
Pennsylvania	......	2,125,000	14,150,000	6,375,000	7,775,000	....
Delaware	......	80,000	410,000	240,000	170,000	....
Maryland	— 4-5	495,000	4,960,000	1,485,000	3,475,000	....
Virginia	— 2-3	1,270,000	12,000,000	3,810,000	8,190,000	....
North Carolina	— 2-3	765,000	2,350,000	2,295,000	55,000	....
South Carolina	— 3-7	605,000	1,300,000	1,815,000	....	515,000
Georgia	+ 1-2	800,000	1,950,000	2,400,000	....	450,000
Alabama	+ 3-5	690,000	1,200,000	2,070,000	....	870,000
Mississippi	+ 4-7	640,000	500,000	1,920,000	....	1,420,000
Louisiana	+ 1-2	470,000	....	1,410,000	....	1,410,000
Tennessee	+ 3-4	950,000	8,750,000	2,850,000	5,900,000	....
Kentucky	— 3-4	855,000	6,000,000	2,565,000	3,435,000	....
Ohio	......	1,850,000	16,800,000	5,550,000	11,250,000	....
Indiana	......	960,000	7,500,000	2,880,000	4,620,000	....
Illinois	......	735,000	4,900,000	2,205,000	2,695,000	....
Missouri	— 6-7	600,000	1,750,000	1,800,000	....	50,000
Arkansas	+ 3-4	152,400	200,000	457,200	....	257,200
Michigan	......	370,000	8,000,000	1,110,000	6,890,000	....
Florida	+ 1-2	75,000	....	225,000	....	225,000
Wisconsin	......	215,000	1,200,000	645,000	555,000	....
Iowa	......	130,000	1,000,000	390,000	610,000	....
Texas	— 6-7	140,000	1,110,000	420,000	690,000	....
District of Columbia	+ 9-10	46,000	16,000	138,000	....	122,000
Oregon	......	20,000	50,000	60,000	....	10,000
		20,746,400	114,245,500	62,239,200	62,470,000	10,463,700

Table—Continued.

States and Territories.	No. bush. of wheat cons'd allowing 3½ to each free person.	Excess.	Deficiency.	No. of bushels of corn produced.	No. bush. corn consumed allowing 5 to each person.	Excess.	Deficiency.
Maine	2,100,000	......	1,210,000	2,890,000	3,000,000	......	110,000
New Hampshire	1,050,000	......	440,000	2,280,000	1,500,000	780,000	......
Massachusetts	2,975,000	......	2,719,000	3,410,000	4,250,000	......	840,000
Rhode Island	455,000	......	450,000	800,000	650,000	150,000	......
Connecticut	1,155,000	......	1,030,000	3,180,000	1,650,000	1,530,000	......
Vermont	1,057,000	......	393,000	2,100,000	1,510,000	590,000	......
New York	9,730,000	4,770,000	......	16,000,000	13,900,000	2,100,000	......
New Jersey	1,456,000	......	356,000	8,000,000	2,080,000	5,920,000	......
Pennsylvania	7,437,500	6,712,000	......	20,200,000	10,625,000	9,575,000	......
Delaware	280,000	130,000	......	3,620,000	400,000	3,220,000	......
Maryland	1,386,000	3,574,000	......	8,300,000	2,475,000	5,825,000	......
Virginia	2,963,000	9,036,669	......	36,500,000	6,350,000	30,150,000	......
North Carolina	1,785,000	565,000	......	25,000,000	3,825,000	21,175,000	......
South Carolina	907,494	392,506	......	10,600,000	3,025,000	7,575,000	......
Georgia	1,400,000	550,000	......	25,000,000	4,000,000	21,000,000	......
Alabama	1,449,000	......	249,000	26,000,000	3,450,000	22,550,000	......
Mississippi	1,279,999	......	779,999	16,000,000	3,200,000	12,800,000	......
Louisiana	822,500	......	822,500	9,000,000	2,350,000	6,650,000	......
Tennessee	2,493,750	6,256,250	......	74,000,000	4,750,000	69,250,000	......
Kentucky	2,244,375	3,755,625	......	62,000,000	4,275,000	57,725,000	......
Ohio	6,475,000	10,325,000	......	66,000,000	9,250,000	56,750,000	......
Indiana	3,360,000	4,140,000	......	38,000,000	4,800,000	33,200,000	......
Illinois	2,572,500	2,327,500	......	33,000,000	3,685,000	29,315,000	......
Missouri	1,799,997½	......	49,997½	25,000,000	3,000,000	22,000,000	......
Arkansas	400,050	......	200,050	7,000,000	762,000	6,238,000	......
Michigan	1,295,000	6,705,000	......	6,500,000	1,850,000	4,650,000	......
Florida	131,250	......	131,250	1,000,000	375,000	625,000	......
Wisconsin	752,500	447,500	......	1,000,000	1,075,000	......	75,000
Iowa	455,000	545,000	......	2,900,000	650,000	2,250,000	......
Texas	420,000	690,000	......	1,500,000	700,000	800,000	......
District of Columbia	144,900	......	128,900	45,000	230,000	......	185,000
Oregon	70,000	......	20,000	525,000	100,000	425,000	......
	62,303,146½	60,922,550	8,980,196⅓	537,350,000	103,732,000	433,228,000	1,210,000

Note.—In the States marked thus (—) the free population is less to the slaves than the proportions named; and in the States marked thus (+) it is greater. For example, in Maryland the proportion of free to slave is less than four-fifths; and in Georgia it is more than one-half

It appears from the table above, that the quantity of wheat consumed by the people of the United States, allowing three bushels to each individual, is 62,239,200 bushels, or three and a half bushels for each white person, 62,303,146½ bushels; and of corn, allowing 5 bushels to each individual, 103,732,000. This estimate gives eight bushels of grain to each person. To be liberal in the allowance for domestic consumption (our purpose being mainly to show the amount which may be left for exportation,) we will add half a bushel of rye to each person, and 6,000,000 bushels of buckwheat to the whole population. Eight and three-fourth bushels of grain, in addition to the animal food consumed, without reckoning beans, peas, and other vegetables and fruits, will be an ample allowance for the sustenance of each individual of the population of the United States for one year.

But large quantities of grain are consumed by cattle, horses, and swine. In the absence of any satisfactory data, the quantity consumed by animals, must be mainly a matter of conjecture. Yet we have some facts upon which we can proceed in our calculations.

If the estimate of the population of the United States for 1847, submitted in the tabular estimate of the crops accompanying the agricultural report, be correct, it will appear that the population of the Union has increased nearly 22 per cent. since the census of 1840. As there has been, during the last seven years, no particular cause operating in this country to check production and accelerate consumption, it may be pretty safely assumed that property, of all kinds, has increased in the same ratio of the increase of population—that is, 22 per cent. since 1840. Assuming the increase of 22 per cent. the following estimate of the number of horses and mules, neat cattle, sheep and swine, in the United States at the present time, is submitted, as a very near approach to the actual number, viz:

		Whole number in 1847
Horses, Mules and Asses.		
Number in 1840,..................	4,335,669	
Increase since estimated at 22 per cent.	953,847	
		5,289,516
Neat Cattle.		
Number in 1840,..................	14,971,586	
Increase since estimated at 22 per cent.	3,293,748	
		18,265,334
Sheep.		
Number in 1840,..................	19,311,374	
Increase since estimated at 22 per cent.	4,248,502	
		23,559,876
Swine.		
Number in 1840,..................	26,301,293	
Increase since estimated at 22 per cent.	5,786,284	
		32,087,577

Note.—In consequence of the rapid development of the pork business in western states, and the consequent greater increase of swine, than in other portions of the Union, we have, in another place estimated the number of swine in the United States at 35,000,000. The latter probably is nearer the true number, and we shall assume it in our estimate of the consumption of corn by domestic animals. For similar reasons we have estimated the number of sheep at 25,000,000.

We therefore estimate the consumption of Indian corn by domestic animals as follows, viz:—

	Bushels.
Consumed by 5,289,516 horses, at 5 bushels per head, ...	26,447,580
" " 18,265,344 neat cattle, at 1 bushel per head, ..	18,265,516
" " 25,000,000 sheep, at ¼ do. do. do....	6,250,000
" " 35,000,000 swine, at 5 do. do. do....	175,000,000
" " Poultry, ...	5,000,000
	230,963,096

This estimate of the consumption of Indian corn by animals, is believed to be sufficiently liberal, after appropriating to them the entire oat crop, and a due allowance of potatoes, turnips, and other vegetables, large quantities of which are used for the food of beasts.

In addition to the quantity of Indian corn consumed by men and animals, probably 25,000,000 bushels are used in distilling and for other purposes.

We now deduct the consumption of the country from the aggregate quantity of grain produced, and thus exhibit the surpluses remaining on hand for exportation:—

	Bushels.	Surplus for exportation. Bushels.
Wheat		
Quantity produced in 1847, ...	114,245,500	
" used for seed, ...	11,424,550	
" consumed, ...	62,239,200	
	73,663,750	40,581,750
Indian Corn, or Maize.		
Quantity produced in 1847, ...	539,350,000	
" used for seed, ...	6,000,000	
" consumed by men, ...	103,732,000	
" consumed by animals, ...	230,963,096	
" used for distilling and other pur- other purposes, ...	25,000,000	
	365,695,096	173,654,904
Rye.		
Quantity produced in 1847, ...	29,222,700	
" used for seed, ...	3,652,587	
" consumption estimated, ...	10,373,200	
" used for distilling, &c.	10,000,000	
	24,325,787	5,296,913
Buckwheat.		
Quantity produced in 1847, ...	11,673,500	
" used for seed, ...	723,343	
" consumed, ...	6,000,000	
	6,723,343	4,950,935
Total surplus for exportation to foreign countries, ...		224,384,502

Liberal deductions may be made from the estimate above, and yet there will remain a surplus of breadstuffs in this country far greater than the demand of all the corn-importing countries of Europe.

It now remains to enquire:

III.—*What countries are purchasers of breadstuffs—What the probable extent of their demand—And which are the countries with which the American agriculturist must compete, with their estimated surpluses and prices.*

In the month of December enquiries were submitted by the Patent Office to certain American ministers and consuls abroad, for information in relation to the product of corn, in the countries in which they reside; whether sufficient was produced to subsist their inhabitants; and what quantity, if any, would be required from other countries. Prompt attention was paid by the functionaries referred to, to the enquiries of this office; but unfortunately the offices to which they applied, were unable to furnish the information sought for.

The object of these enquiries, was, to enable the Patent Office to lay before the country an estimate of the probable demands of foreign countries for American produce, during the present commercial year.

The famine which unfortunately prevailed in Europe in 1846 and 1847, caused a very considerable increased demand for American breadstuffs and provisions. That calamity resulted from the destruction of the potato crop and from scanty harvests generally. The harvests of corn abroad, in 1847 were abundant. The potato was much injured by the plague which has assailed it, but suffered less than in the previous year. On the whole, then, it is believed that the foreign demand for American breadstuffs and provisions, during the current commercial year, will be much less than it was in 1846, but considerably greater than in average years.

It cannot be desired that years of dearth and famine should occur in any country, to occasion an increased demand for the great staples which our favored country produces in such teeming abundance, and therefore, the American agriculturist should not base his calculations upon the necessities of other countries which grow out of casual periods of scarcity or calamity. On the contrary, he should look to the steady demand which results from their ordinary wants. He will then know how large a demand there is to be supplied, and whether he can furnish the supplies needed at lower prices than the agriculturists of other countries which produce surpluses for exportation.

We have taken some pains to ascertain the countries which are likely to import grain in ordinary years; the extent of their demands; the countries which produce surpluses; the amount of their surpluses; and the prices at which grain, (more particularly wheat) can be purchased and transported to England, which may be regarded as the great corn mart of the world.

The following may be regarded as the principal corn purchasing countries of the world, viz: Great Britain, France, Holland, the West India Islands, British American colonies, Brazil and South America generally.

The following table, compiled from Spachman's Statistics of the British Empire and the British Almanac, shows the quantity of wheat and wheat flour, imported into Great Britain, the quantity exported, and the quantity delivered for consumption, during a period of ten years, commencing with 1837.

Table exhibiting the quantity of wheat and wheat flour imported into Great Britain, the quantity re-exported, and the quantity entered for home consumption, during ten years, commencing with 1837 *and ending with* 1846, *expressed in bushels.*

Year.	Imports. Bushels.	Exports. Bushels.	Entered for home consumption. Bushels.
1837	8,875,936	2,467,363	6,408,576
1838	15,387,200	1,268,968	14,118,232
1839	24,885,832	340,096	24,545,738
1840	20,213,160	697,936	19,515,224
1841	23,385,512	443,120	23,142,392
1842	22,165,176	1,207,560	20,957,560
1843	24,322,152	503,736	23,818,736
1844	8,519,536	661,240	7,858,296
1845	11,055,816	3,840,008	8,215,808
1846	18,815,256		23,582,656
	10)177,625,576	11,400,024	172,163,218
Annual average,	17,762,557	1,140,002	17,216,321

In 1847 the whole quantity of all kinds of grain imported into Great Britain was 10,840,000 imperial quarters, or 86,720,000 bushels. What portion of it was wheat, we have not been able to ascertain precisely.

The following statement is taken from a letter of the London Correspondent of the "*National Intelligencer*," and professes to be an "exact statement of grain imported into the United Kingdom, and money paid for it, during the last two years, as stated in late parliamentary proceedings:—

Grain imported, 1846,	4,770,000 quarters.
Do. do. 1847,	10,840,000 do
Paid for grain, June, 1846, to January, 1857,	£5,139,000
Do. January to July, 1847,	14,184,000
Do. July to October, 1847,	14,260,000
Cost, in fifteen months,	£33,583,000

The national loss from the potato disease is estimated at £33,000,000."

The ordinary demand of Great Britain hereafter may be set down at 20,000,000 of bushels annually of wheat. A large quantity of other grain will also be required.

We have not been able to obtain the returns from other countries for a series of years. But, from the best authorities which we have been able to consult, we have compiled the following table, exhibiting the quantity of wheat (exclusive of other grains) required by the principal corn purchasing countries of the world.

Table.

Countries.	Quantity required—Bushels.
Great Britain,	20,000,000
France,*	5,000,000

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* During the year ending June 30, 1847, France imported 9,827,515 hectolitres of cereal grains, or about 27,025,665 bushels. "*Le Cultivateur, ou Journal Des Progrés Agricoles,*" for September, 1847.

Countries.	Bushels.
West Indies generally,	2,500,000
British American colonies,	2,250,000
North America generally,	350,000
South America generally,	1,900,000
Holland,*	1,000,000
Total	33,000,000

The ordinary annual demand for wheat in the principal corn importing countries of the world, is not far from 33,000,000 bushels. This demand is, of course, affected by extraordinary causes. Occasionally a plentiful harvest will diminish it; while on the other hand a short harvest, or destruction of some crop like the potato, will greatly increase it. In 1847, it was greatly increased by the latter cause.

If the estimates submitted of the surplus of wheat raised in the United States be correct, it will be seen that the American agriculturists are able to supply the ordinary demands of the corn importing countries of the whole world. But they have competitors in this great commerce of breadstuffs, and it remains to see who they are, and the extent of the competition.

The principal grain exporting countries in Europe appear to be Russia, Prussia, Denmark and Sicily; in Asia, Syria; in Africa, Egypt. We have two estimates of the quantities of grain which the countries above named produce (or import from other countries) for exportation. The first which we submit is an estimate prepared for the *London Mark Lane Express*, of April 5th, 1847. It was prepared at a season when enquiry was keen and active for the sources whence the great *deficit* in the English and Irish harvests was to be supplied.

Table exhibiting the countries (except the United States) whence Great Britain could receive supplies in 1847, *and the quantities of all kinds of grain which could be obtained from them; prepared for the London Mark Lane Express.*

Countries.	Bushels.
Russia on the Black Sea	16,000,000
Russia on the Danube	12,000,000
Russia, northern ports	4,000,000
Egypt and Syria	4,000,000
Prussian, Pomeranian and Danish ports on the Baltic	1,600,000
	37,600,000

The second estimate we submit, is in the form of a table compiled from a table published in McGregor's Commercial Statistics, vol. 2, p. 738, embodying the British consular returns for 1843. The information which it contains, having been obtained by the most careful enquiry in every corn mart in Europe, is unquestionably the most reliable. It embraces only wheat, and exhibits, at one view, the surpluses at the different grain marts, the prices on ship-board, cost of transportation to England, and total cost in England, reduced to equivalents in federal money.

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* Holland is an entrepôt for corn imported from Germany and other states on the Baltic, and destined for other countries

Table exhibiting the surplus quantity of wheat for exportation at the principal corn marts of Europe, the average prices per quarter, and average cost of transportation to England, and the average cost when landed in the ports of England, exclusive of duty.

Grain markets.	Quantity of wheat for exportation.		Price per quarter on ship board.	Cost of freight to England.	Total cost and freight.	Total cost and freight reduced to their equivalents in Federal money.	Cost per bushel in England, exclusive of duty, in Federal money.
	Quarters.	Equivalent in bushels.					
			s. d.	s. d.	s. d.	dolls. cts.	dolls. cts.
St. Petersburgh	192,500	1,540,000	39 1	4 8½	43 9½	10 61	1 32½
Riga..............	.. ..	.. ..	49 7	4 9	54 4	13 17	1 64½
Liebau............	30,000	240,000	43 7	4 9	48 4	11 72	1 46½
Odessa	150,000	1,200,000	26 6	10 0	36 6	8 76	1 09½
Warsaw...........	300,000	2,400,000	36 0	3 9	39 9	9 64	1 20½
Stockholm..........	1,000	8,000	32 6	4 9	37 3	9 03	1 13
Dantzic............	315,000	2,520,000	40 0	3 9	43 9	10 61	1 32½
Konigsberg	65,000	520,000	42 6	5 0	47 6	11 52	1 44
Stettin	250,000	2,000,000	40 0	4 6	44 6	10 79	1 34½
Memel.............	5,964	47,712	35 0	4 6	39 6	9 58	1 19½
Elsinore	175,000	1,400,000	33 0	4 3	37 3	9 03	1 13
Hamburgh..........	538,000	4,304,000	40 6	3 9	44 3	10 73	1 34
Rotterdam..........	.. ..	.. ..	55 0	2 3	57 3	13 88	1 73½
Antwerp	.. ..	.. ..	56 5	2 3	58 8	14 22	1 77½
Palermo............	200,000	1,600,000	38 0	8 3	46 3	11 21	1 40
Total.	2,222,464	17,779,712					
General average.			40 6	4 9¾	45 3¾	10 99	1 37¾

Notes.—Riga.—Rye, barley and oats, are the principal grains exported from Riga. The following are the only returns (which we find in McCulloch's Commercial Dictionary,) we have been able to obtain of the export of wheat, viz:

Years.	Quantity in Russian lasts (about 95 bushels.)	Quantity in bushels.
1831	11,365	1,079,875
1832	4,957	470,346
1833	407	38,665

Riga depends upon Courland and Lithuania for her supplies of wheat for export, and those are not always to be relied on. The British consul at Riga, in his report under date of Nov. 30th, 1841, says the harvest in these provinces for that year "has only turned out satisfactory with regard to spring corn, whilst the wheat and rye crops have not yielded even a middling average; so that but little rye and no wheat can be looked for from those two provinces for next year's exportation." We are inclined to think that Riga will not hereafter be a large exporter of wheat.

Odessa.—The export of wheat in 1846, was 1,955,316 chetwerts, or 11,700,000 bushels. While the exports of Odessa increased in 1846, that of many of the ports mentioned in the table above greatly diminished.

Rotterdam.—According to a table published in McGregor's Commercial Statistics, vol. 1, p. 824, the value of "grain, or corn and flour for food," exported from Rotterdam in 1841, was £207,280. Allowing fifty-five shillings per quarter, it would seem that the quantity exported in 1841 was 75,374 6-11 quarters, or 602,997 bushels. This quantity included rye. We have been able to find no later returns of the export of grain from this port.

Antwerp.—The value of all kinds of grain from this port in 1839 (the total returns we have,) was 766,200 francs, or about $147,481. The export is therefore small.

Palermo.—The estimate in the table is for abundant harvest only.

From the two tables above, we infer that the whole quantity of wheat produced for exportation, by the grain-exporting countries of the world, excluding the United States, is not far from 20,000,000 bushels, and that the great rival of the United States is Russia. She produces the most and sells it the cheapest, certainly at the port of Odessa on the Black Sea. She has, however, but few ports, and her means of transportation from the interior, are not so great as those possessed by the United States. It is doubtful, too, whether Russia can produce grain cheaper than the western states of the American Union. From enquiries submitted during the last summer, answers to which will be found in Appendix No. 3, it appears that the cost of growing wheat in the United States, is as follows, viz:

In New Hampshire,	$1 10	per bushel.
" New York, western	64	"
" Pennsylvania,	40	"
" Ohio, northern,	50	"
" Michigan,	28 to 67⅓	"
" Indiana,	25 to 35	"

These sums include every expense, (interest on the value of the land being one item,) which attends the culture of wheat from the preparation of the land to thrashing and storing. Of course, the cost varies in different years, in proportion as the harvest is abundant or scarce. For example, the cost of raising a bushel of wheat in Michigan is given from four years actual experiment, and was as follows: 1st year a bushel cost the grower 67⅕ cts.; 2d year, 36⅘ cents; 3d year 28 cents; 4th year 30 cents.

The cost of producing Indian corn is as follows, viz:

	Cost per bushel.
New Hampshire	50 cents.
Connecticut	36½ "
Michigan	30 "—11 2/4—17¾*
New York, western	29 "
Pennsylvania	16¼ "
Ohio, northern	20 "

In view of the facts above stated, it is confidently believed that the grain growers of the United States can successfully compete with those of any other nation in the great corn marts of the world.

We have shown in the last of our tables the cost of a bushel of grain purchased in the leading corn marts of Europe delivered in England. We propose now to submit some facts which will enable the American farmer to judge whether or not the conclusion which we have expressed be sound, that he can compete with the foreign corn grower in the markets of England. And as freight is one of the principal elements of cost, we first give a table showing the freight on a barrel of flour and a bushel of grain, on the Erie Canal from Buffalo to Albany, New York, and from Pittsburgh to Philadelphia. And also on the same article from the other principal ports of the United States, to Liverpool:

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* Cost for three years, affected by short or abundant harvests. The estimates are those of practical farmers residing in the states mentioned, and may be relied upon.

Freights (tolls included) on the Erie Canal to Albany.

	From Buffalo.	From Rochester.
Flour, per bbl.	75 cents.	56 cents.
Grain, per bushel,	21 "	16 "

Freights from Pittsburg to Philadelphia.

Flour, per bbl	$1 00.
Grain per bushel	30 to 33 cents.

Freights to Liverpool.

	From Boston.	N. York.	Philadelphia.	Baltimore.	N. Orleans.
Flour & meal per bbl.	24 to 36 cts.	30 to 48	48	66	96 to 1 08
Grain per bushel.	-- —	9 to 12	12 to 14	12	— —

The rates of freight from Albany to New York we have not been able to obtain, but they cannot exceed 2 cents per bushel for grain, and 6 cents per barrel for flour. Add 2 cents per bushel more for storage and other expenses of grain on the way from Buffalo to New York, and 6 cents more for a barrel of flour. The flour barrel will probably cost 33 cents more, and grinding and bolting 30 cents.

Calculating five bushels of wheat to a barrel of flour, the cost of a barrel of flour put up at the Rochester mills in New York, and delivered in Liverpool, would be thus:

Five bushels of wheat at sixty-four cents per bushel, first cost,	$3 20
Grinding and bolting,	30
Barrel,	33
Freight to Albany,	56
" and charges from Albany to New York,	12
" from New York to Liverpool (average,)	39
Insurance, wharfage, &c.	25
	5)5 15
Cost of wheat per bushel in Liverpool when exported in the form of flour,	$1 03

It is proper to remark that, in the absence of correct information we have estimated some of the items in this calculation, but we believe, sufficiently high to cover the actual cost.

We are therefore confirmed in the conclusion, that the American grain-growers can deliver grain or flour at as low a price in England, as the grain growers of any other country, not excepting Russia on the Black Sea; and that they have it in their power to command the great grain market of Great Britain, and of nearly all the corn importing countries of the world.*

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* Russia is beyond question the great rival of the United States in the corn markets of the world. We have before us an estimate by a Russian nobleman, prepared for the "*London Economist*," of the average quantity annually of grain of all kinds produced in Russia. The statement is as follows:

"The present population of Russia, in Europe, is 65,000,000, of whom about 15,000,000, are males, engaged in agriculture. On an average there are annually sown with *winter grain*, 18,750,000 hectares, yielding

	Hectolitres.	
At least nine hectolitres per hectare, or	168,750,000	
Deduct seed at the rate of two hectolitres per hectare	37,500,000	
Leaving a clear produce of four and a half fold		131,250,000
Spring grain, 18,750,000 hectares, yielding at least thirteen and a half hectolitres per hectare, or	253,125,000	
Deduct seed at the rate of three hectolitres per hectare, or	56,250,000	
Leaving also a clear produce of four and a half fold, or		196,875,000
Together		328,125,000

Or equal to 112,844,239 imperial quarters.

The annual consumption of 65,000,000 of population may be taken at	195,000,000	
The annual consumption in brewing and distillation,	25,000,000	
The annual consumption for food of horses, cattle, &c., say of 25,000,000 head (exclusive of refuse from breweries and distilleries, grass and hay,)	50,000,000	
The annual consumption for fattening cattle, hogs, poultry, &c.,	7,000,000	
Estimated total consumption of the country,		277,000,000
Leaving on the most moderate computation, an average annual surplus for exportation, of		51,125,000

Or 17,582,200 imperial quarters."

Or 140,657,600 bushels. One hectare is nearly two and a half English acres. One hectolitre is a little more than two and three-fourths imperial bushels.

Large as the statement from the "Economist" makes the quantities of the grain produced annually in Russia to appear, it may, perhaps be not too great. We find in McGregor's Commercial Statistics, volume 2, page 734, the following statement of the produce of grain in Russia, in Europe, derived from Schnitzler's Statistics of that empire, in 1835, viz:

Average quantities sown, 50,000,00 chetwerts. Average produce three and a half for one. Total average produce, 181,000,000 chetwerts, or about 126,500,000 quarters, (or 1,012,000,000 bushels.) Total average consumption, including seed and the supply of distilleries, 141,000,000 chetwerts. Total average disposable surplus, 40,000,000 chetwerts, or about 28,000,000 quarters, (or 224,000,000 bushels.) These quantities include grain of all kinds.

In a recent German work of great authority and ability, we have found a very full description of the soil, climate and productions of Russia, which impresses us with the belief that the productive capabilities of that empire are much exaggerated. We annex a few paragraphs, extracted from the work alluded to:

"Agriculture in Russia is still in its primitive state, though the number of products and their quantity is great, no province furnishes more than one-half of its natural capacity. For this reason does the soil, *in by far the greatest portion* of Russia, possess no real intrinsic value; the latter depending entirely on the labor of man, so that instead of asking the number of acres, the number of hands that belong to it, form the measure of its value. The best cultivated provinces of Russia are on the Baltic, in the provinces adjacent to Moscow, and in the Russian provinces of Poland; but even in these provinces are to be found immense districts of which not the fifteenth part is as yet taken into cultivation.

The whole area of Russia in Europe is 1,742,145,725 Prussian acres, of which 676,000,000 are covered with forests and under-wood; 771,000,000 acres are wholly unfit for cultivation, ("unland";) there remains consequently but 246,500,000 acres fit for agricultural purposes, and about 24,500,000 acres capable of being used as pasturage.

Indian corn (maize,) is principally grown on the shores of the Black Sea; the provinces on the Baltic and western Russia furnish the greatest quantity of hemp and flax; potatoes have but lately been generally introduced; the raising of grain (oats, &c.,) for feeding cattle is entirely neglected.

There exists an official seven years' average for the whole crop of all the Russias, Poland alone excepted. From this it appears that the yearly crop of all Russia yielded 167,112,224 chetwerts; while that of Poland alone amounted to 280,906,000 chetwerts.

According to official reports on the state of agriculture, it appears that, in 1832, there were used as seed 19,269,088 chetwerts of winter grain, and in the spring of 1833, 28,920,754 chetwerts of summer grain, making together 48,189,842 chetwerts of grain.

The exports from Russia were—

In the year	(One chetwerts is equal to six English bushels, nearly.)
1830	3,935,000 chetwerts.
1831	3,790,000 "
1832	3,500,000 "

In 1833 there was an entire failure of crops, which in 1834 caused the permission of free importations of grain which, from a partial failure of the crops of 1834 was, by an imperial ukase, dated December 1st, 1834, extended, for the ports of the Black Sea and the Sea of Asof, to the 1st of January, 1836, and in consequence of a new total failure of crops in southern Russia, further extended by the ukase of the 9th January, 1835, to the Austrian and Prussian frontier and the ports of the Baltic and the White sea. The abundant grain crops of Poland, especially in the Woiwodships, Sendomir, Lublin and even Massovia, have already been celebrated in the middle ages; but they are more owing to the excellent soil than the progress of agriculture in that country.

See Handbauch der Allgeminen Staats Kunde in Europe von Dr. Friedrich Wilhelm Schubert, Professor der Geschichte und Staats Kunde, and der Universitat zu Königsberg.

(Handbook of the general science of states in Europe, by Dr. Frederick William Schubert, Professor of history and science of state at the University of Konigsberg,) Konigsberg, 1835, 1 vol. 1st section, pp. 211, 214.

Table exhibiting an estimate of the value of the products of labor and capital in the United States for the year 1847.

Articles.	Quantities.	Prices.	Value.	Total Value.	Remarks.
Agricultural Products.	Bushels.	dolls. cts.	Dollars.	Dollars.	General Observation.—In estimating the value for 1847 of several of the articles in this table, the amount as given by the census for 1840 is assumed as the basis, and 22 per cent. added to that sum, which is the ratio of the increase of population during the last seven years, it being reasonable to suppose that the value of the industry and capital of the Union has increased in proportion to the increase of population. Political economists assume that the population of a state, without regard to age, sex, or condition, serves to indicate, more truly than any other basis of calculation, its productive power.—*See the Madison Papers, pages 28 to 30.* There being no satisfactory data for some of the estimates contained in this table, they are very probably above or below the real truth. But imperfect as they are, they may enable others to make nearer approximations to the true quantities or values. The estimates of the quantities and value of hemp, flax, hops, beeswax, molasses, wine, products of orchards and nurseries, are all based upon the census of 1840, allowing 22 per cent. for increase. A little over 45 gallons of molasses are allowed for every 1,000 lbs. of cane sugar. The census of 1840 contains no return of honey. Bevan, in his work on the Honey Bee, estimates 30 lbs. of honey for each pound of wax produced. On that basis we have made our estimate. The estimate for straw, &c. is made upon the following basis, viz: $4 worth of straw is allowed for every 30 bushels of English grain, and $1 of fodder for every 20 bush. of Indian corn. An intelligent farmer of Delaware (John Jones, Esq.) estimates $8 worth of straw for every 30 bush. of English grain, and $1 of fodder for every ten bushels of Indian corn. In the French tables the straw and residuum are put down at about 11½ per cent. on the whole value of agricultural products and products of the forest. A less proportion is allowed for pasturage after harvest than in the French tables.
Wheat	114,245,500	1 20	137,094,600		
Indian Corn	539,350,000	40	215,740,000		
Barley	5,649,950	80	4,519,960		
Rye	29,222,500	65	18,994,625		
Oats	167,867,000	25	41,966,750		
Buckwheat	11,673,000	50	5,836,500		
Potatoes	100,950,000	20	20,190,000		
Beans	25,000,000	1 00	25,000,000		
Peas	25,000,000	1 20	30,000,000		
	Tons.				
Hay	13,319,900	8 00	106,559,200		
Hemp and Flax	116,207	150 00	17,431,050		
	Pounds.				
Tobacco	220,164,000	05	11,008,200		
Cotton	1,041,500,000	07	72,905,000		
Rice	103,040,500	03	3,091,215		
Sugar	324,940,500	06	19,496,430		
Silk cocoons	404,000	2 00	808,000		
Hops	1,510,972	10	151,097		
Beeswax	766,530	22	168,636		
Honey	22,995,900	10	2,299,590		
	Gallons.				
Molasses	13,000,000	25	3,250,000		
Wine	152,175	1 00	152,175		
Pasturage, value of	....	....	20,000,000		
Value of straw, chaff and residuum of the crops	....	....	74,000,000		
Value of pasturage after the crops are taken off	....	....	7,500,000		
Products of Orchards.	Dollars.			838,163,928	
Value of in 1840	7,256,904				
Increase 22 per cent	1,596,518	....	8,853,422		

	Annual value estimated at $15 per garden.			
Products of Gardens.				
Number estimated at 3,000,000..		......	45,000,000	
Products of Nurseries.				
Value of in 1840..............	593,534			
Increase 22 per cent...........	130,577	......	724,111	54,577,533
Live Stock and its products.				
Sheep—number in 1847........	25,000,000			
Estimated value of lambs and mutton sold................	....	......	12,500,000	
Wool—pounds................	60,000,000	30	18,000,000	
Neat cattle—number in 1847...	18,265,334			
Increase and value of cattle sold for beef....................	....	......	40,000,000	
Swine—number in 1847........	35,000,000			
Two-thirds slaughtered annually, say 23,000,000, valued at five dollars each animal..........	....	......	115,000,000	
Horses, mules and asses—number in 1847................	5,289,516			
Value of increase (labor not estimated)...................	....	......	7,934,250	
Poultry, value of in 1840......	$9,344,410			
Increase 22 per cent...........	$2,055,770	......	11,400,180	
Eggs, number consumed.......	1,037,320,000	half cent	5,186,200	
Live geese feathers, pounds....	2,000,000	50	1,000,000	
Products of the Dairy.				
Value of in 1847..............	33,787,008			
Increase 22 per cent...........	7,433,141	......	41,220,149	252,240,779
Products of the forest, including lumber, furs and skins.......	....	......	21,599,628	
Fire wood—number of cords...	25,000,000	1 50	37,500,000	59,099,628
Products of the fisheries, including whale, cod, mackerel and all other fisheries...........	....	......	....	17,069,262
Capital employed in Commerce, Trade, and Internal Transportation....................	$390,972,423			
Profits at six per cent.........	....	......	....	23,458,345
Manufactures.				
Products—value of............	....	......	....	550,000,000

GARDENS.—In the United States, particularly in the country, every family has a garden. It is believed that three gardens to every four families will not be an unreasonable allowance for the number, and $15 per garden for the value of the products.

The business of wool-growing being considerably increased in Ohio, Michigan, and other western states, a larger increase than 22 per cent. is allowed to the number of sheep.

Number of neat cattle in 1840....... 14,971,586
Increase 22 per cent............... 3,293,748—18,265,334

The value of the increase and number of cattle sold for beef, in the absence of satisfactory data, must necessarily be a rough estimate.

Pork Trade.—In consequence of the great increase of the pork trade in the U. States, a larger increase than 22 per cent. is allowed for the number of swine. As swine are usually slaughtered at the age of eighteen months, we have assumed that two-thirds of the whole number are slaughtered each year.

Horses, &c.—Whole number in 1840...... 4,335,669
Increase 22 per cent......... 953,847—5,289,516

An increase of three per cent. per annum, gives 158,685 animals, worth $50 per head.

In the "Journal d'Agriculture Pratique et de Jardinage" it is estimated that each of the inhabitants of the city of Paris consumes 138 eggs per annum. It is probably very much above the actual number consumed. We have, in our estimate, allowed 50 eggs for the consumption of each individual of the population of the United States, each year, and estimated their value at half a cent each egg. Of the quantity of feathers produced in the United States, we have no information. We put the item in because it exists, hoping hereafter to obtain satisfactory information in relation to it.

There are more than 4,000,000 families in the U. States, allowing 5 persons to a family. Allowing six cords of fire wood to a family would give about 25,000,000 cords. It is probably very much below the actual consumption.

Capital, &c.—Based upon the census of 1840.

The estimated amount of capital for 1847, is the amount for 1840, as appears by the census tables, with 22 per cent. added.

Manufactures.—A little more than 22 per cent. added to capital of 1840, in consequence of the expansion of the manufacturing interest in the southern and western states.

Table.—Continued.

Articles.	Quantities.	Prices.	Value.	Total Value.	Remarks.
				Dollars.	
Mines.—Products of, including iron, lead, gold, silver, marble, granite, salt, coal, &c. &c....	....	......	....	74,170,500	*Mines.*—Census of 1840 the basis, with such corrections as the latest returns authorize.
Banding & Insurance, profits of.					The last four items are crude estimates, there being no satisfactory data on which to found them. In Great Britain the rentals amount to about £65,000,000 or $315,000,000.
Bank capital	$208,216,000				
Capital of insurance companies*	Not known.	......	....	20,000,000	
Money loaned at interest, profits of	....	......	....	25,000,000	There are in the U. States probably 10,000 lawyers, 15,000 physicians and surgeons, 20,000 clergymen of all sects and religions, besides editors, professors of science, belles lettres, arts, music, school teachers, &c. &c. But there are no satisfactory data from which their aggregate incomes can be calculated.
Rentals of houses and lands,....	....	......	....	50,000,000	
Professions, profits of...........	....	......	....	50,000,000	
Total	....	......	....	$2,013,779,975	

* Capital of insurance companies in Massachusetts in 1847—

Marine and fire (with specific capitals) aggregate......	$5,825,000	
Do. do. (mutual) assets	1,230,182	
		$7,055,182
In New York in 1845—		
Marine and fire (with specific capitals) aggregate......	7,267,000	
Do. do. (mutual) assets	4,405,478	
Insurance and trust companies	5,000,000	
		16,672,478
		$23,727,660

Thus it appears that the aggregate amount of the products of labor and capital in the United States, in 1847, was $2,013,779,975, if the estimates in the preceding table are correct. It is proper, however, to remark that, in the census of 1840, among the statistics of manufactures, the following items appear; viz: Mills and the articles produced, $76,545,453; houses, $41,917,401; ships, $7,016,094; manufactures of cotton, $46,350,453; manufactures of wool, $20,696,999; house-hold goods, $29,025,380. From the items enumerated it is apparent that a large portion of the aggregate value of manufactures produced in the United States, consists of raw material, which has been included in the census statistics, as well as in our estimates, in other forms, and should therefore be deducted from the aggregate amount. It is believed that the cost of the raw material is equal to one-half, at least, of the whole value of the products of manufactures; the other half representing the wages of labor and the profits of capital. Having been estimated in other forms, it is proper that it should be deducted from the general amount. One-half would be $275,000,000; thus showing the grand aggregate of the products of the labor and capital of the United States, in 1847, to be $1,738,779,975.

Perhaps other deductions and allowances of a similar character should be made, and very probably, some additions. Precise accuracy is not pretended in the estimates above submitted. With the materials at hand, and within the reach of this office it could not be attained. Our table may, therefore, be deemed an experiment. It is hoped that it will attract the attention of the intelligent investigator, and be the means of eliciting suggestions which will enable us to make a nearer approximation to truth in future estimates which we may make. Friendly criticism will be very gratefully received, and any suggestions which will enable us to render our work more perfect, will be carefully considered. It is designed to re-publish the table in the reports of this office for a series of years, with such corrections and improvements as more accurate information may justify. By this method we hope in time to make it as accurate and reliable as such a paper can possibly be.

Table exhibiting an estimate of the population and property (real and personal) of each state and territory of the United States, in 1847.

States and Territories.	Population including free and slave.	Amount of property real and personal per head.	Total amount of property (real and personal) of each state and of the United States.
Maine,........................	600,000	400 dollars.	240,000,000
New Hampshire,.................	300,000	" "	120,000,000
Massachusetts,.................	850,000	" "	340,000,000
Rhode Island,..................	130,000	" "	52,000,000
Connecticut,...................	330,000	" "	132,000,000
Vermont,.......................	302,000	" "	120,800,000
New York,......................	2,780,000	" "	1,112,000,000
New Jersey,....................	416,000	" "	166,400,000
Pennsylvania,..................	2,125,000	" "	850,000,000
Delaware,......................	80,000	" "	32,000,000
Maryland,......................	495,000	" "	198,000,000
Virginia,......................	1,270,000	" "	508,000,000
North Carolina,................	765,000	" "	306,000,000
South Carolina,................	605,000	" "	242,000,000
Georgia,.......................	800,000	" "	320,000,000
Alabama,.......................	690,000	" "	276,000,000
Mississippi,...................	640,000	" "	256,000,000
Louisiana,.....................	470,000	" "	188,000,000
Tennessee,.....................	950,000	" "	380,000,000
Kentucky,......................	855,000	" "	342,000,000
Ohio,..........................	1,850,000	" "	740,000,000
Indiana,.......................	960,000	" "	384,000,000
Illinois,......................	735,000	" "	294,000,000
Missouri,......................	600,000	" "	240,000,000
Arkansas,......................	152,400	" "	60,960,000
Michigan,......................	370,000	" "	148,000,000
Florida,.......................	75,000	" "	30,000,000
Wisconsin,.....................	215,000	" "	86,000,000
Iowa,..........................	130,000	" "	52,000,000
Texas,.........................	140,000	" "	56,000,000
District of Columbia,..........	46,000	" "	18,400,000
Oregon,........................	20,000	" "	8,000,000
Total,.........................	20,746,400		$8,298,560,000

The following is the principle upon which the table above is constructed. We have obtained the valuations of real and personal property (upon which the taxes are assessed) in the states of Pennsylvania and Ohio, for 1847, and that of New York for 1846. To the latter we have added three per cent. being the ratio of the increase of population. Making this addition to the valuation of New York, the following are the amounts for the three non-slaveholding states above named, viz:

States.	Valuation in 1847.
New York,..................................	$634,977,913
Pennsylvania,..............................	465,789,951
Ohio,......................................	409,897,379
Total..................................	$1,510,665,243

As the valuation of property with a view to the assessment of taxes is at least 25 per cent. below its actual value, we add to the above sum one-fourth part or 25 per cent. in order to get at the true amount

of property real and personal in the three states above named, which is,	377,666,310
	$1,888,331,553

The population of the states before mentioned, according to our estimate of population submitted with the crops, (for which see *ante*) is as follows; viz:

	Population.
New York,	2,780,000
Pennsylvania,	2,125,000
Ohio,	1,850,000
	6,755,000

Dividing the aggregate amount of property by the aggregate population of the three states, and the result is $279 69½ per head.

We have also the valuations of two slaveholding states, Kentucky and Maryland, for 1846. They are as follows, viz:

	Valuation in 1846
Kentucky,	$242,388,967
Maryland,	177,555,846
	$419,944,813
To this sum we add three per cent., the ratio of increased population, in order to bring it up to 1847, which is,	12,598,344
And twenty-five per cent. for under valuation, as in the case of the three free states, which is,	108,135,789
Making in the whole	$540,678,946

The population of Kentucky and Maryland, in 1847, according to our estimate, is as follows, viz:

	Population.
Kentucky,	855,000
Maryland,	495,000
Total,	1,350,000

Dividing the aggregate amount of the property by the aggregate population of the two states last mentioned, we have $400 for each individual.

Now, it cannot be supposed that the assessors of taxes in the states of Kentucky and Maryland, have over-estimated the property to be taxed. And admitting that they have not under-estimated it, the result would give a little over $320 per head of the population.

Adhering to our belief that property in the states of Kentucky and Maryland would be as likely to be under valued for taxation, as in the states of New York, Pennsylvania and Ohio; but believing that, in consequence of slaves being subjects of valuation and taxation, more property is visible and therefore more readily assessed than in the three last, we adhere to the allowance of 25 per cent. for under-valuation. We therefore, take for the basis of the table above, the sum of $400 and apply it to the population of the whole union. The result is, $8,298,560,000.

We think it will not be contended that the amount of property, per head, is less in the free than in the slave states. On the contrary, it is probably more, and making a reasonable allowance for the difference, we believe we may safely estimate the property personal, real, and mixed, or the aggregate capital of the United States, in 1847, at $10,000,000,000.*

In reference to the table above it is proper to remark that we have no means of separating the real from the personal property, and therefore have made no distinction between them in our estimates.

MISCELLANEOUS TABLES.

Prices of Flour at Albany from 1824 *to* 1846 *inclusive.*

The Albany Argus of the 29th has a statement of the average prices of flour in that city for twenty-three years, from 1824 to 1846, inclusive, taken on the market prices during the season of canal navigation. It is worth quoting:

Years.	Average price.	Highest price.	Lowest price.	Difference of price.
1824	$5 38	$5 50	$5 25	$0 25
1825	4 77	4 87	4 63	0 24
1826	4 61	5 13	3 88	1 25
1827	4 72	5 75	4 63	1 12
1828	5 78	7 50	4 50	3 00
1829	5 69	7 00	4 50	2 50
1830	5 19	5 25	4 88	0 37
1831	5 69	6 25	5 19	1 06
1832	6 02	6 25	5 75	0 50
1833	5 55	5 75	5 38	0 37
1834	5 01	5 31	4 81	0 50
1835	6 31	6 94	5 75	91 1
1836	8 19	10 00	7 00	3 00
1837	9 64	12 00	8 50	3 50
1838	8 09	9 00	7 00	2 00
1839	6 99	8 75	6 00	2 75
1840	4 94	5 63	4 75	0 88
1841	5 61	6 75	4 88	1 87
1842	5 36	6 50	4 13	2 37
1843	4 93	5 38	4 50	0 88
1844	4 53	4 88	4 13	0 75
1845	5 00	6 88	4 25	2 63
1846	4 90	6 00	3 75	2 25

The highest average price, $9 04, was in 1837; lowest average price, $4 53, was 1844. The highest price absolutely was $12, in 1837; the lowest was $3 75 in 1846. The greatest fluctuation was in 1837, when flour varied from $8 50 to $12.

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* In the free states there is more concentrated capital than in the slave states—in other words more money invested in stocks, merchandise, banks, insurance companies, loaned at interest, &c. In these forms it is to a great extent invisible, and out of the reach of the assessor of taxes. Whereas, in the slave states, the capital consists in real property and in slaves, which are visible and tangible, and cannot be concealed from the assessor. These facts account for the apparent fact that the proportion of capital in the slave states, is more per head than in the non-slaveholding states.

Prices of Provisions in New York, from 1823 *to* 1847, *inclusive.*

The following table of the average prices of provisions in New York for twenty-five years will be found useful to many readers:

Year.	Mess Pork.	Prime Pork.	Mess Beef.	Prime Beef
1823	$13 31	$9 78	$8 53	$5 88
1824	13 78	10 32	8 58	5 82
1825	13 83	10 22	9 04	5 95
1826	11 55	7 84	9 35	5 13
1827	13 21	8 62	9 23	6 37
1828	13 71	10 06	9 55	6 67
1829	12 79	10 24	9 43	7 38
1830	13 64	9 87	9 24	6 14
1831	14 30	11 13	8 51	5 77
1832	13 77	11 22	9 75	5 80
1833	14 97	11 53	9 77	5 96
1834	14 29	10 21	9 57	6 05
1835	16 96	13 08	11 26	7 75
1836	23 13	17 65	11 42	7 48
1837	21 66	15 99	14 28	8 85
1838	21 97	16 59	14 98	11 40
1839	19 32	15 72	14 93	11 04
1840	15 07	12 96	12 98	8 90
1841	11 36	9 48	9 25	5 89
1842	9 27	7 23	7 85	3 94
1843	10 32	8 59	7 46	5 18
1844	9 28	7 39	5 75	3 75
1845	12 13	9 51	7 64	5 46
1846	10 50	8 73	7 44	5 23
1847	15 00	12 58	11 25	8 41

The highest year for pork (mess) was 1836, when it reached $23 13, the lowest, 1842, when it was down to $9 27. In 1838 mess beef rose to $14 98; and in 1844, fell to $5 75.

Table exhibiting the average freights up and down on the Erie Canal for seventeen years, commencing with 1830 *and ending with* 1847 *inclusive* :—

Year.	Up freight per 100 lbs. from Albany to Buffalo.			Down freight per barrel, 216 lbs., from Buffalo to Albany.		
	Average for year.	Toll deducted.	Leaving freight.	Average for year.	Toll deducted.	Leaving freight.
1830	1 00	51	49	98	55	43
1831	99	51	48	96½	55	41
1832	1 00	51	49	1 00	55	45
1833	74	44	36	88	39	49
1834	82	33	49	83¼	35	48
1835	80	33	47	68½	35	33
1836	1 05	33	72	77	35	42
1837	93	34	60	81¼	35	46
1838	85	33	52	73	35	38
1839	85	33	52	75¾	35	41
1840	83	33	50	81	35	46
1841	61	33	28	71	35	36
1842	66	33	33	65	35	30
1843	56	33	23	60¼	35	25
1844	65	33	32	60½	35	25
1845	48	33	15	71½	35	26
1846	40	24	16	64	31	33
1847	39	24	15	77	31	46
	13 61	6 41	7 20	13 81	6 86	6 93
Total av. for 18 years.	76	36	40	77	38	39

Since the preceding matter was prepared, we have received the following communications from the Hon. Millard Fillmore, Comptroller of the State of New York. Hon. Robert McClelland and Hon. N. K. Hall, members of the House of Representatives, giving the freights upon the western lakes and the Erie canal. From all the information we can obtain, we think we can safely express the opinion that the American agriculturist can put down a bushel of wheat upon the wharf in Liverpool for about $1, and not lose money

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COMPTROLLER'S OFFICE, Albany, April 19th, 1848.

Sir :—Yours of the 14th inst., requesting me to furnish you with the price of freights from Buffalo to New York, has been received.

According to the report of the commissioners of the canal fund for 1847, the freight on a barrel of flour from Buffalo to Albany was 39 cents, toll 38 cents; total 77 cents. On wheat per bushel of 60 pounds, (calculated,) 18½, toll of which is 8$\frac{9}{10}$ cents, or 4 mills per 1000 pounds per mile.

The following estimate of prices for 1848, has been made by one of the oldest forwarding merchants of this city, viz :—

" Canal freight, tolls included, on a barrel of flour from Buffalo to Albany, will average	62½ cents.
Albany to New York,	10 "
	72½ cents.
Wheat from Buffalo to Albany, 60 pounds,	17 "
Albany to New York,	3 "
	20 cents

Corn, Buffalo to Albany, say	13 cents.
Albany to New York,	2½ "
	15½ cents.

It may be proper to say the toll on corn is about one-fourth less than on wheat.

I send you a report of the commissioner of canal fund for 1846, containing the amount of toll, trade, tonnage, &c., for 1846, made to the legislature April 1st, 1847. The report for 1847, made in 1848, will be printed in a few days. I will forward a copy to you.

Respectfully yours, MILLARD FILLMORE.

Hon. Edmund Burke, Com. Patents.

Erie Canal Transportation—From Albany to Buffalo, 363 *miles.*

The toll from Albany to Buffalo, on one hundred pounds of merchandize, is now	$0 24
The average charge for freights, over and above tolls, in 1845 was fifteen cents, and in 1846 sixteen cents.	
I presume a fair living price for the year is	16
Cost of transportation, including tolls,	$0 40
The toll from Buffalo to Albany, on a barrel of flour, (216 lbs.,) is now	$0 31
The average cost of freight, over and above tolls, was, in 1842, thirty cents; in 1843, 25 cents; 1844, 25 cents; 1845, 26 cents, and in 1846, 33 cents.	
I presume it would afford a fair profit at	28
	$0 59

Last year freights were very high in consequence of the great foreign demand for breadstuffs.

The averages given are for the year, but in the summer prices are much lower. In 1846 the average freight on flour, (over and above tolls,) for three months in the middle of the season, was only twenty and a half cents.

When the Erie canal is enlarged, the cost of transportation (over and above tolls,) will be reduced about thirty-three and one-third per cent., and it is probable that the tolls will be reduced in a still greater proportion.

I presume the freight from Albany to New York, on a barrel of flour is from ten to fifteen cents—say average of twelve and a half—one hundred and fifty miles. N. K. HALL.

House of Representatives, *Washington*, April 20, 1848.

Washington, April 20, 1848.

Dear Sir:—I would have answered your inquiries sooner, but I did not procure the necessary information until to-day. *Usually* the freight on a bushel of wheat from Detroit to Buffalo, is three or four cents, and on a barrel of flour twelve to fourteen cents. In the spring and fall freights are higher than at any other time, and for the last two seasons they have been remarkably high, owing to the foreign call for our breadstuffs.

Herewith you have a memorandum of Hon. Mr. Hall of Buffalo, which I send you by his permission.

Respectfully yours, R. McCLELLAND.

Hon. E. Burke.

Shipping Grain to England—Prices in New York and Liverpool.

The tables which we have given below, are particularly interesting, and should be preserved by every dealer and farmer as a future reference. By comparing the current rates at any period of the year, wheat and corn, in New York and Liverpool, with the estimate here given, the probable shipments can be readily conjectured. In order to cover costs and charges, wheat must be bought in New York, and sold in Liverpool at the following rates:

Price in New York.			*Price in Liverpool.*	
75c.	per 60 lbs.	requires sale	a 5s. 9½d	per 70 lbs.
80c.	"	"	a 6s. 0½d	"
90c.	"	"	a 6s. 7d.	"
95c.	"	"	a 6s. 11d.	"
100c.	"	"	a 7s. 2½d.	"
105c.	"	"	a 7s. 6d.	"
110c.	"	"	a 7s. 9½d.	"
115c.	"	"	a 8s. 1d.	"
120c.	"	"	a 8s. 4½d.	"
125c.	"	"	a 8s. 8d.	"
130c.	"	"	a 8s. 11d.	"
135c.	"	"	a 9s. 2d.	"
140c.	"	"	a 9s. 5d.	"
145c.	"	"	a 9s. 8d	"
150c.	"	"	a 10s.	"

Where freights range from 11d. per imperial bush. of 70 lbs. with 5 per cent. primage, to 2s. per bushel, there should be added to the above rates from 1¼d. to 1s. 6½d. per bushel. The sales in New York are always made at 60 lbs. the bush. and in Liverpool at 70. The charges are made up of the following items:—Say ex. at 7 per cent.; commission, &c., 4 per cent.; brokerage, &c., 3c. per bush.; marine insurance 1¼ per cent.; dock and town dues, cartage, storage, fire insurance, loss in weight, 2½ per cent.; commission for selling, &c., 4½ per cent., to which must be added the current rates of freight.

Corn.—Indian Corn, by the same rule, with 7 per cent. exchange, and 9d. sterling freight, with 5 per cent. primage, gives the estimate below. In order to *cover cost and charges*, the purchase in New York, and the sales in Liverpool, must be at the following rates:

Prices in New York.			*Prices in Liverpool.*	
45c.	per 56 lbs.	requires sales	a 30s. 2d	per 480 lbs.
50c.	"	"	a 32s. 1d.	"
55c.	"	"	a 34s. 1½d.	"
60c.	"	"	a 36s. 3d.	"
65c.	"	"	a 38s. 4d.	"
70c.	"	"	a 40s. 6d.	"
75c.	"	"	a 42s. 8d.	"
80c.	"	"	a 45s.	"
85c	"	"	a 47s. 3d.	"

90c. per 56 lbs. requires sales	a 49s. 6d.	per 480 lbs.
95c. " "	a 51s. 9d.	"
100c. " "	a 54s.	"

If freights range from 10d., (with 5 per cent. primage) to 2s. per imperial bushel, there must be added to the above rates, from 9½d. to 12s. per 480 lbs.—*Onondaga Democrat.*

The Money and Food Crisis in England in 1847.—*Valuable Statistical Tables.*

We are indebted to a friend for a valuable official document. It embraces a statistical history of money and business affairs in Great Britain during the last year. We proceed to compile from it various interesting facts:

Prices of Upland Bowed Cotton.

Monthly average for 1847:

January, per lb.	7¼d.	July, per lb.	7⅜d.
February	6¾	August	7⅜
March	6½	September	7
April	6⅞	October	5¾
May	6½	November	5⅛
June	7½	December	4⅞

The Manchester Money Market.

Monthly average rates for 1847.

January, per cent.	4	July	5½
February	4½	August	6½
March	4½	September	6½
April	5½ to 6	October	6½ to 7½
May	6	November	8
June	5½	December	7½ to 8

The British Funds.

Three per cent. Consols.

January 2	94½	July	89
February 2	91½	August	88
March	90½	September	88
April	89	October	85½
May	87	November	82
June	88	December	86

Bank of England Interest.

January 2, per cent.	3	October 23, per cent.	8
" 16,	3½	November 27	7
" 23,	4	December 4	6
April 10	5	" 25	5
August 7	5½		

Prices of Wheat.

	s.	d.		s.	d.
January 2	64	4	June 5	99	10
February	73	10	July 3	87	1
March 6	74	4	August 7	75	5
April 3	77	1	" 29	102	5
May 1	79	6	Dec. 11, (the lowest) when it was	51	11
May 29, highest	102	5			

[*Penn. Enquirer*

EXPORT OF BREADSTUFFS FROM THE UNITED STATES IN 1847.

FOREIGN EXPORT OF WHEAT AND RYE FLOUR, CORN MEAL, WHEAT, CORN, RYE, ETC., AND SHIP BREAD FROM THE UNITED STATES IN 1847.

A statement of the quantity and destination of the following articles exported from the United States to foreign countries during the year commencing on the 1st of July, 1846, *and ending on the 30th of June,* 1847.

AMERICA.

Articles.	British N. American Colonies.	The West Indies generally.	South America generally.	North America generally.
Flour..................bbls.	272,299	483,571	328,937	66,993
Wheat................bush.	919,058	15,105	......	200
Indian corn..................	119,615	593,029	3,964	23,925
Corn meal.............bbls.	39,936	176,418	2,750	10,354
Rye meal..................	27,401	3,480	101	180
Rye, oats, and other small grain and pulse............value	$24,312	$113,355	$2,291	$18,599
Ship bread.............bbls.	20,506	54,788	1,711	21,218
" ....kegs	220	13,267	7,437	673

EUROPE.

Articles.	England and Scotland.	Ireland.	France.	Spain and Portugal.	Other parts of Europe.
Flour..................bbls.	2,144,581	342,495	612,641	1,312	113,429
Wheat................bush.	2,078,652	465,911	749,242	....	170,421
Indian corn..................	7,527,586	7,998,939	7,248	4,892	22,203
Corn meal.............bbls.	426,070	287,013	4,401	....	605
Rye meal..................	4,030	2,362	3,006	....	8,332
Rye, oats, and other small grain and pulse............value	$565,322	$66,580	$50,697	....	$752,081
Ship bread.............bbls.	34,736	11,994	3,771	....	1,728
" ....kegs.	6,647	556	16	....	548

OTHER COUNTRIES.

Articles.	Asia generally.	Africa generally.	South Seas and Pacific Ocean.	Total quantity.	Total value.
Flour..................bbls.	8,674	36,800	764	4,382,496	$26,133,811
Wheat................bush.	1,362	......	...	4,399,951	6,049,350
Indian corn..................	175	24,474	...	16,326,050	14,395,212
Corn meal.............bbls.	77	436	...	948,060	4,301,334
Rye meal..................	....	......	...	48,092	225,502
Rye, oats, and other small grain and pulse............value	$4,596	$2,368	131	....	1,600,962
Ship bread.............bbls.	3,166	5,609	1,753	160,980	556,266
" ....kegs	136	1,482	100	31,082	
Total value..					$53,262,437

The foregoing statement was prepared at the Treasury Department for the Philadelphia "Commercial List." It will be seen that the total value of exports amount to the enormous sum of $53,262,437 in a single year. The total exports were—

Flour....................bbls.	4,382,496	Rye flour................bbls.	48,982
Wheat....................bush.	4,399,951	Ship bread....................	160,980
Corn........................	16,326,050	" ....kegs	31,082
Corn meal................bbls.	948,062	Rye, oats, &c.............value	$1,600,962

Total value of the above articles.......................... $53,262,457

During the year the exports were—

Flour....................bbls.	2,289,476	Rye meal................bbls.	38,530
Wheat....................bush.	1,613,795	Ship bread....................	114,992
Indian corn..................	1,828,063	" ....kegs	25,505
Corn meal................bbls.	298,790		

The total value of which was.......................... $15,987,156

Increase in the value of the exports in 1847 over those of 1846, $37,275,271.

[*Hunt's Magazine*

The following table of prices of American produce quarterly during the year 1847, *is prepared from Still. Day & Co's. Price Current.*

	4th January, 1847.		3rd May, 1847.		3rd September, 1847.		14th January, 1848.	
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Ashes, duty free. Brand, 1845–6.								
Montreal, Pot, per cwt.		28 0	30 0	31 0	31 0	32 0	28 6	29 0
Pearl, "		28 0	29 0	30 0	34 0	36 0	33 0	34 0
U. States, Pot, "	24 0	24 6	28 6	29 0	29 0	30 0	26 6	27 0
Pearl, "	24 6	25 0	27 0	27 6	33 0	34 0	30 0	31 0
Bacon, duty free, dried and smoked, per cwt.	36 0	40 0	46 0	50 0	35 0	40 0	15 0	30 0
Long middles free from bone in salt, "	44 0	56 0	57 0	65 0	40 0	63 0	24 0	40 0
" " Rib in "	40 0	50 0	53 0	63 0	40 0	63 0	22 0	35 0
Short " free from bone "	48 0	56 0	60 0	65 0	40 0	63 0	25 0	40 0
" " Rib in "	44 0	50 0	58 0	63 0	40 0	63 0	22 0	36 0
Shoulders "	29 0	35 0	30 0	40 0	30 0	37 6	20 0	28 0
Bark, duty free—quercitron, per cwt. N. Y. and Phila.	11 0	12 0	12 0	16 0	14 0	16 0	9 0	11 0
Beef, duty free—new.	80 0	85 0	90 0	93 0	90 0	92 6	84 0	90 0
Prime mess, per tierce, 304 lbs.	70 0	75 0	85 0	90 0	82 0	88 0	70 0	76 0
" " " ordinary.	60 0	65 0	75 0	80 0	None.		68 0	84 0
Mess, per barrel, 200 lbs.	38 0	44 0	55 0	60 0	50 0	56 0	40 0	46 0
" " ordinary	None.		None.		42 0	48 0	36 0	40 0
Extra India, family &c., per tierce 336 lbs.	85 0	95 0	100 0	105 0	100 0	110 0	95 0	100 0
Bees' wax, Unbleached, duty free, per cwt	£7 0s.	£7 10 0	£6 17 6	£7 5 0	£6 10 0	£7 5 0	£5 0 0	£6 0 0
Butter, duty, B. P. 2s 6*d*. per cwt., For. 10*s*. per cwt.	Grease, free.		Grease, free.		Grease, free.		Grease, free.	
U. S. fine, duty paid, per cwt	70 0	83 0	80 0	91 0	None.		None.	
Canadian " "	60 0	76 0	64 0	74 0	60 0	70 0	63 0	70 0
Grease " "	Nominal.		37 0	40 0	48 0	52 0	None.	
Bones, duty free, shank, per ton.	£7 0 0	£8 10	£7 0 0	£9 0				
Mixed "	£5 0 0	£6 10	£4 0 0	£6 0				
Cheese, duty, B. P. 1*s*. 6*d*., For. 5*s*. 0*d*.								
Fine, duty paid, per cwt.	50 0	53 0	51 0	54 0	52 0	55 0	46 0	49 0
Middling " "	43 0	47 0	45 0	49 0	46 0	49 0	38 0	45 0
Ordinary " "	40 0	42 0	40 0	44 0	21 0	44 0	30 0	37 0
Corn, &c., duties as per average at foot.								
Wheat, U. S. and Canadian, per 70 lbs.. Duty paid.								
White and mixed.	10 0	11 3	11 0	12 2	6 6	7 6	8 0	9 0
Red.	9 6	10 6	10 8	11 6	6 0	6 9	6 6	8 0

Table—Continued.

	4th January, 1847.				3rd May, 1847.				3rd September, 1847				14th January, 1848.			
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Flour, sweet, per barrel, in bond	34	0	40	0	40	0	41	0	25	0	25	6	29	0	29	6
Sour	33	0	34	0	39	0	40	0	23	6	24	0	28	6	29	0
Duty paid. Western Canal and Richmond	40	0	42	0	38	0	39	0	23	6	24	0	28	0	29	0
" Philadelphia and Baltimore	39	0	41	0	38	0	39	0	20	0	21	0	27	0	28	0
" New Orleans and Ohio	37	0	39	0	40	0	41	0	24	0	26	0	28	0	30	0
" Canadian	38	0	41	0	35	0	37	0	18	6	19	0	22	0	24	0
" U. S. and Canadian, sour	35	0	36	0	4	11	5	3	2	2	2	6	2	6	3	0
Oats, per 45 lbs., duty paid	5	3	5	6	50	0	51	0	26	0	28	0	23	0	27	0
Oatmeal, per 240 lbs	47	0	48	0	50	0	54	0	25	0	31	0	31	0	34	0
Indian corn, per 480 lbs., duty paid	68	0	70	0	25	0	26	0	14	0	15	0	14	0	15	0
Indian meal, per barrel, 196 lbs	31	6	32	6	6	8	7	0	3	0	4	0	3	0	34	0
Barley, per 60 lbs., duty paid	6	6	7	0	54	0	56	0	None.				3	0	2	9
Rye, per 480 lbs. "	44	0	48	0	56	0	62	0	30	0	40	0	33	0	40	0
Peas, per 504 lbs. "	60	0	62	0	56	0	64	0	20	0	30	0	35	0	45	0
Kidney beans, or black-eyed peas, duty free, per 480 lbs	50	0	54	0					0	10	0	13	0	8	0	10
Cotton, duty free					0	10	0	14½	0	15	0	17	0	12	0	13
Sea Island, ordinary to middling	0	11	0	13½	0	17	0	19	0	20	0	24	0	15	0	18
fair to good fair	0	15	0	16	0	20	0	24	0	5½	0	6	0	3½	0	4
good to fine	0	17	0	22	0	5	0	6	0	7	0	8	0	5	0	6
Do. Stained, ordinary to middling	0	5½	0	6½	0	7	0	8	0	9	0	10	0	6½	0	7
fair to good fair	0	7	0	8½	0	9	0	10	0	6⅛	0	6⅞	0	3¾	0	4⅜
good to fine	0	9½	0	10	0	5⅝	0	6¼	0	7⅛	0	7½	0	4¾	0	5
Bowed Georgia, ordinary to middling	0	6½	0	6⅞	0	6½	0	6⅞	0	7¾	0	8	0	5¼	0	5½
fair to good fair	0	7¼	0	7⅜	0	7¼	0	7½	0	6¼	0	6⅞	0	2¾	0	4½
good to fine	0	7½	.	..	0	5¾	0	6⅜	0	7¼	0	7½	0	4¾	0	5
Mobile, Alabama, and Tennessee, ordinary to middling	0	6⅝	0	7⅛	0	6⅜	0	7	0	7¾	0	8	0	5¼	0	5½
fair to good fair	0	7½	0	7¾	0	7¼	0	7½	0	6	0	6½	0	3¾	0	4
good to fine	0	7⅞	.	..	0	5½	0	6	0	0	0	0	0	4¾	0	4¾
New Orleans, ordinary to middling	0	6⅝	0	7¼	0	5⅝	0	6⅜	0	6¼	0	6⅞	0	3¾	0	4⅝
fair to good fair	0	7¾	0	8	0	6⅞	0	7¼	0	7½	0	8	0	5	0	5½
good to fine	0	8¼	0	8¾	0	7½	0	9	0	8½	0	9	0	6	0	8
Hams, dry, duty, B. P. 2*s.* per cwt., For. 7*s.*																
Smoked or dry in canvass, per cwt. duty paid	50	0	60	0	40	0	60	0	20	0	60	0	20	0	50	0
Hams—in casks, in salt, not smoked, per cwt., duty free	40	0	55	0	50	0	56	0	25	0	40	0	25	0	35	0

Hemp, duty free. Dew-rotted, per ton	£25 0	£26 10	£26 0	£27 0	£28 0	£31 0	£25 0	£28 0
Hackled	£28 0	£31 0	£30 0	£34 0	£30 0	£34 0	£28 0	£30 0
Hides, duty free. Wet salted, per lb	0 2½	0 3¼	0 2½	0 3	0 2¼	0 3	0 1⅛	0 2
Dry "	0 4	0 5	0 4	0 5	0 4	0 4½	0 3¾	0 4
Kips "	0 4	0 4½	0 3¾	0 6	0 3¾	0 4	0 3¾	0 4
Tanned " Oak bark	0 7½	0 9	0 6½	0 15½	0 6½	0 14½	0 4	1 0
" " Hemlock	0 6¾	0 7	0 6	0 11½	0 5	0 11	0 3	0 9
Horns, duty free. Buffalo, per cwt	12 0	15 0	12 0	13 0	10 0	13 6	8 6	16 0
Ox and Cow, per 123 lbs	10 0	44 0	10 0	45 0	15 0	40 0	8 0	35 6
Tips, per cwt	15 0	20 0	15 0	20 0	13 0	15 0	13 0	15 0
Hops, duty 45*s.* per cwt., in bond, per cwt	40 0	45 0	40 0	50 0	40 0	50 0	30 0	50 0
Lard, duty free. Fine leaf in kegs, per cwt	45 0	46 6	51 0	52 6	53 0	55 0	55 0	58 0
Ditto in barrels	43 0	46 6	48 0	51 0	50 0	53 0	53 0	56 0
Ordinary to middling	40 0	42 0	44 0	47 0	45 0	48 0	50 0	52 0
Inferior and grease	31 0	38 0	29 0	33 0	29 0	33 0	30 0	33 0
Linseed cake, duty free, per ton	£10 0	£11 12	£7 0	£9 0	£7 0	£8 10	£8 10	£9 10
Lead, duty, B. P. 5*s.* per ton, For. 20*s.* per ton.								
Pig in bond, per ton	£16 0	£17 10	£16 0	£17 0	£16 10	£17 10	£15 10	£17 0
Molasses, duty 7*s.* 10*d.* per cwt., duty paid	None.		None.		None.		None.	
Oils, lard, duty free, per ton	£40 0	£44 0	£42 0	£46 0	£38 0	£42 0	None.	
Sperm, duty £15 per ton; duty paid per ton	£85 0	£87 0	£90 0	£92 0	£85 0	£87 0	£86 0	£88 0
Whale, duty free per ton	£27 0	£30 0	£30 0	£32 0	£26 0	£28 0	£27 0	£28 10
Pitch, duty free, per cwt	3 0	3 6	3 0	4 6	2 9	3 6	2 6	3 0
Pork, duty free. Prime mess, new, per barrel, 200 lbs	62 0	68 0	70 0	77 0	65 0	70 0	48 0	60 0
" " Old "	55 0	60 0	65 0	70 0	55 0	60 0	30 0	40 0
Mess "	60 0	65 0	65 0	84 0	65 0	74 0	50 0	56 0
Prime "	47 0	52 0	54 0	63 0	48 0	55 0	35 0	40 0
Rice, dressed, duty 1*s.* per cwt., duty paid	29 0	34 00	25 0	26 3	20 0	22 6	19 9	21 6
Second quality			24 0	25 0	19 0	21 6	16 6	18 6
Rosin, duty free, amber and yellow, per cwt	3 0	6 0	4 6	11 0	2 9	7 6	1 11	7 0
Seeds. Flax, duty free per hhd. of 7 bushels	40 0	42 0	45 0	52 0	43 0	46 0	43 0	46 0
Clover, duty 5*s.* per cwt., duty paid per cwt	35 0	45 0	35 0	40 0	35 0	40 0	35 0	40 0
Timothy, duty free	15 0	25 0	20 0	25 0	20 0	25 0	20 0	25 0
Staves, duty free.								
White oak pipe, per mille of 1200	£10 0	£16 0	£12 0	£15 0	£11 0	£15 0	£11 0	£15 0
Hogshead "	£9 0	£16 0	£10 0	£15 0	£10 0	£14 0	£10 0	£14 0
Barrel "	£5 10	£7 10	£6 0	£7 10	£4 10	£7 10	£4 10	£7 10
Sugar, Louisiana, white clayed not refined, duty 24*s.* 6*d.* per cwt. duty paid, per cwt	None.		None.		None.		None.	
Muscovado, duty 21*s.*, duty paid	None.		None.		None.		None.	
Tallow, duty, B. P. 1*d.* per cwt., For. 1*s.* 6*d.* Duty paid, per cwt.	48 0	51 0	47 0	49 0	44 0	47 6	45 0	47 6

Table—Continued.

	4th January, 1847.				3rd May, 1847.				3rd September, 1837.				14th January, 1848.			
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Tar, duty free per barrel	13	0	15	0	12	6	14	6	14	0	16	0	12	0	14	0
Tobacco, duty on leaf, 3*s.* and manufactured, 9*s.* per lb																
Virginia leaf, faded, per lb., in bond			0	2			0	2			0	2	0	2½	0	2¾
Ordinary sound			0	3			0	3			0	3	0	3	0	3½
Middling	0	3½	0	4	0	3½	0	4	0	3½	0	4			0	4
Good	0	4½			0	4½			0	4½			0	4½	0	5
Fine, nominal	0	5			0	5			0	5			0	5½	0	6
Stemmed, sound	0	3	0	6	0	3	0	6	0	3	0	6	0	3	0	6
Kentucky leaf	0	2	0	3½	0	2	0	3½	0	2¾	0	3½	0	2¾	0	4
Stemmed	0	3	0	5	0	3	0	5	0	3	0	5	0	3	0	5½
Manufactured	0	4	0	9	0	4	0	9	0	4	0	9	0	4	0	9
Tongues, duty, B. P. 2*s.* 0*d.* per cwt., For. 7*s.*																
Ox, in pickle, in bond, per dozen	14	0	18	0	18	0	21	0	15	0	20	0	10	0	16	0
Pigs " " per cwt	32	0	34	0	34	0	40	0	25	0	35	0	15	0	25	0
Turpentine, duty free, unless above 15*s.* per cwt. in value; duty then 2*s.* per cwt.																
Rough duty free, per cwt	7	6	9	6	10	0	12	0	7	0	9	0	5	6	6	6
Spirits, duty 5*s.* per cwt., duty paid, per cwt	49	0	50	0	50	0	56	0	39	0	41	0	33	0	35	0
Whalebone, B. P., duty free, For. 20 p. ct. U. S. duty pd, per cwt.	None.				None.				None.				None.			
Wool, duty free	......		......		......		......		0	3	0	8	0	3	0	8
1st quality merino, full blood Hogget fleeces, per lb	1	7	1	9	1	7	1	9	1	5	2	0	1	4	1	10
" Wether fleeces, combing	1	5	1	7½	1	5	1	7½	1	4	1	7	1	4	1	7
" Ewe fleeces, clothing	1	4	1	6	1	4	1	6	1	3	1	6	1	2	1	6
2nd Quality half-bred, ⅓ to ¾ blood Hogget fleeces	1	4	1	6	1	4	1	6	1	2	1	5	1	1	1	4
" Wether fleeces, combing	1	3	1	5	1	3	1	5	1	2	1	4	1	1	1	3
" Ewe fleeces, clothing	1	2	1	3	1	2	1	3	1	1	1	3	1	0	1	2
3rd quality, common, natural to ¼ blood Hogget fleeces	1	2	1	4	1	2	1	3	1	1	1	3	0	10½	1	1
" Wether fleeces, combing	1	1	1	3	1	1	1	3	1	0	1	3	0	10½	1	0½
" Ewe fleeces, clothing	1	0	1	1	1	0	1	1	0	11	1	1	0	10	0	11
Skin or pulled wool—super skin	1	4	1	6	1	4	1	6	1	4	1	6	1	2	1	4
" " Half fine, do	1	2	1	3	1	1	1	2	1	1	1	2	1	0	1	2
" " Common	0	11	1	1	0	11	1	0½	0	11	1	0½	0	10	1	0
" " Canadian lamb skin	1	1	1	5	1	1	1	5	1	1	1	5	0	11	1	3

Liverpool Imports of North American Produce, from 1st January to 31st December, in each year.

	Beef.		Pork.	Cheese.		Tallow.		Lard.		Butter.	Tobacco.	Wool.	Hides.	Ashes.		I. Corn.	Wheat.	Flour.
	Tierces.	Barrels.	Barrels.	Casks.	Boxes.	Hhds.	Barrels.	Barrels.	Kegs.	Firkins.	Hhds.	Bales.		Pot.	Pearl.	Quart's.	Quart's.	Barrels.
1843	5,300	2,856	1,749	4,500	19,093	2,685	1,996	23,550	20,706	13,469	13,732	..	17,226	13,372	6,466	....	13,256	100,322
1844	9,912	9,186	7,689	5,289	18,245	3,471	2,605	19,393	29,795	3,789	12,441	246	35,160	11,806	5,724	....	23,073	346,568
1845	15,171	3,487	7,913	5,322	43,984	3,520	3,619	10,471	54,292	9,791	13,370	3,976	54,681	14,239	6,516	....	41,895	363,402
1846	26,251	9,305	15,154	4,289	63,113	3,597	5,030	20,879	65,451	9,200	15,020	1,982	50,750	8,243	3,440	200,000	194,603	1,184,012

APPENDIX No. 20.

As a means of showing the bearing of our agricultural resources on the whole business of the country, it has been deemed desirable to collect the statistics of the interior trade of the United States.

All has not been effected that was intended; but enough will be found in the tables which follow, to indicate that a perfect development of materials would be exceedingly valuable, and it is believed that such a beginning might with no great difficulty be carried out, so as to furnish the facts relating to the interchange of commodities among the different states, from which every person might make his own deductions; and thus supply the place of much conjectural reasoning, according as one or another theory is embraced as a favorite one.

A few explanatory observations may be useful, before we give the tables.

Our internal trade is carried on as is well known, mainly, by means of lakes, rivers, canals, and rail roads. These form the great lines of communication between the Atlantic and other states. Although the products of fields and sections of the country are concentrated at various points which are the larger or smaller markets for the farmer, by means of their wagons or carts, yet the great masses of such material are poured along through our rivers, lakes, canals and over our rail roads.

If therefore we would form a correct estimate of the interior trade of our country, we must, so far as practicable, ascertain the amounts which are in transit or which rest at the various points where account is taken of the ex ports or imports. It is true we may thus have the same produce several times included in the estimate, but this is unavoidable, as no means are afforded us of discrimination between the already enumerated and that which is new. Did our room allow, we could give a variety of materials which we have collected; but we are compelled to condense them as much as possible, though at the hazard of omitting many things which might prove interesting to some readers. We have freely used those public journals and various documents which present to us the best sources of information on the various topics, and as it is not convenient in all cases to make special acknowledgments, we may just say here, that foremost among the journals to which we are indebted for valuable materials, either for quotation or deduction, are the Buffalo Commercial Advertiser, the New York Shipping List, the Philadelphia Commercial List, Lyford's Baltimore Commercial Journal and the New Orleans Price Current. These with a great number of mere local sources of intelligence, such as are comprised in the various newspapers and periodicals which notice the statistics of products and trade, have enabled us to draw together numerous columns of statements respecting the prosperity of our country which are not found in any one volume, and with this acknowledgment we avail ourselves of whatever we may find desirable.

The points on the Atlantic coast to which our interior trade is directed, are Boston, New York, Philadelphia, Baltimore and New Orleans. We know that there are intervening ones, such as Richmond, Charleston, Savannah and Mobile, but it will be sufficient for our purpose to limit our investigations to the five great ones specified. From each of these points there proceed great lines of communication with the interior, and especially the west, as follows:

From Boston by rail road to Albany and thence by canal or rail road and lakes to the west.

From New York by Hudson river to Albany, thence by canal or rail road and lakes.

From Philadelphia by river, rail road and canal, and rail roads and river Ohio—via Pittsburg.

From Baltimore by Baltimore and Ohio rail road and national road to Wheeling.

From New Orleans by Mississippi upwards and Missouri and branches.

By obtaining, therefore, the amounts of produce on these great lines, we ascertain in a great degree the state of the internal trade of our country, especially if we include the termini: such as Cincinnati, St. Louis, Chicago, and various other points which occur in the whole extent. We have found much fuller materials in reference to some of these lines of transit and points of concentration, than with regard to others. Thus the states of New York, Pennsylvania and Ohio, which are among the largest and possess the greatest number of miles of canal and rail road are most complete, while we have been unable to gather any particulars, scarcely, with respect to some of the others.

We have considered the matter of chief importance in this connexion, to give the agricultural products, among which the export trade of cotton, tobacco, breadstuffs, pork and beef, &c. are prominent. Yet on reference to the tables it will be seen that there are likewise a great number of smaller articles which in aggregate make up considerable sums, and which could not well be omitted.

Time did not allow us to go through all the lines of canals with the same degree of minute condensation, we have adopted in respect to the canals of Ohio, nor did we possess as ample means for the purpose. The different modes of reckoning applied to the same article on the different lines has likewise occasioned some inconvenience, as well as the periods of time which do not always coincide. Our aim has, however, been to give a fair comparative estimate, in some instances embracing only the years 1847 and the previous one, in others it extends further back.

From the Albany Atlas.

Statement showing the quantity and value of each article which came to the Hudson river, on all the canals, during the years 1846 *and* 1847.

THE FOREST.	1846.	1847.	1846.	1847.
Furs and peltry, pounds	817,150	556,000	$1,021,385	$690,150
Products of wood—				
Boards and scantling, feet	260,335,271	299,078,633	4,422,936	5,078,564
Shingles, M	69,822	101,527	244,378	405,548
Timber, cubic feet	1,798,198	1,613,943	251,096	169,160
Staves, pounds	106,152,500	95,104,000	1,513,432	1,239,677
Wood, cords	11,832	13,331	59,160	79,986
Ashes, barrels	46,812	37,538	1,076,904	1,135,288
AGRICULTURE.				
Products of animals—				
Pork, barrels	80,093	76,179	800,925	1,104,673
Beef, barrels	45,600	71,266	364,800	718,344
Bacon, pounds	4,000,500	4,902,000	290,037	416,738
Cheese, pounds	35,560,118	40,844,000	2,844,587	2,860,354
Butter, pounds	21,477,657	22,724,000	3,220,633	3.408,751
Lard, pounds	6,721,000	4,348,000	498,810	434,780
Wool, pounds	8,866,376	12,044,000	2,571,415	3,599,963
Hides, pounds	340,900	172,000	42,613	21,611
Vegetable food—				
Flour, barrels	3,063,441	3,952,972	15,470,271	27,057,037
Wheat, bushels	2,950,636	4,143,830	3,366,141	5,833,901
Rye, bushels	321,799	295,119	232,304	259,950
Corn, bushels	1,610,149	6,053,845	1,126,854	5,170,970
Barley, bushels	1,427,953	1,523,020	813,933	1,279,337
Other grain, bushels	1,920,800	2,040,052	720,474	977,967
Bran and ship stuffs, bushels	1,468,232	2,093,681	229,181	293,117
Peas and beans, bushels	96,800	106,088	96,800	106,088
Potatoes, bushels	230,939	108,369	114,685	51,755
Dried fruit, pounds	1,502,900	3,558,000	135,261	320,364
All other agricultural products—				
Cotton, pounds	445,100	447,000	34,495	35,498
Tobacco, pounds	2,609,100	1,228,000	313,092	150,735
Clover and grass seeds, pounds	1,094,400	3,308,000	76,608	231,518
Flax seed, pounds	5,283,700	4,128,000	131,943	103,219
Hops, pounds	1,690,500	1,948,000	185,955	188,179
MANUFACTURES.				
Domestic spirits, gallons	1,426,549	1,693,076	313,840	473,651
Leather, pounds	5,160,655	5,168,000	928,918	965,204
Furniture, pounds	2,226,114	1,972,000	223,611	197,251
Bar and pig lead, pounds	489,800	482,000	19,592	19,288
Pig iron, pounds	16,574,740	21,608,000	182,574	340,496
Bloom and bar iron, pounds	10,892.243	26,348,000	265,222	660,896
Iron ware, pounds	1,219,091	3,014,000	48,830	123,808
Domestic woollens, pounds	1,425,340	1,756,000	1,923,390	2,369,187
Domestic cottons, pounds	2,324,774	2,396,000	719,787	740,901
Salt. barrels	692,442	382,390	180,035	133,836
Merchandise, pounds	3,594,322	9,662,000	276,872	517,594
Other articles—				
Stone, lime, and clay, pounds	44.200,033	59,094,000	63,170	83,129
Gypsum, pounds	12,084,100	8,518,000	26,933	17,584
Mineral coal, pounds	18,846,600	32,580,000	47,116	81,453
Sundries, pounds	90,841,614	147,988,000	3,633,257	2,944,914
Statement showing the aggregate, in tons, under the divisions as specified in the above.				
The forest, tons	603,010	666,113	8,589,291	8,798.373
Agriculture, tons	628,454	897,717	33,662,818	54,624,849
Manufactures, tons	46,076	51,532	4,805,799	6,024,518
Merchandise, tons	1,797	4,831	276,872	517,594
Other articles, tons	82,982	124,090	3,770,476	3,127,080
Total, tons	1,362,319	1,744,283	$51,105,256	$73,092,414

SHIPMENTS EAST.

Statement showing the aggregate quantity of each article first cleared on the canal at Buffalo, Black Rock and Oswego, from the opening to the close of canal navigation, during 1846 *and* 1847.

Articles—Description.	Quantity.	
The Forest.	1846.	1847
Fur and peltry, pounds	601,493	406,106
Product of wood—		
Boards and scantling, feet,	49,858,613	69,673,236
Shingles, thousand,	4,467,918	8,867,510
Timber, cubic feet,	351,081	357,854
Staves, pounds,	75,339,407	70,820,624
Wood, cords,	18,187	22,140
Ashes, barrels,	32,243	21,062
Agriculture.		
Product of Animals—		
Pork, barrels,	71,516	64,751
Beef,	37,187	41,725
Bacon, pounds,	2,769,129	3,826,299
Cheese,	9,841,911	11,804,317
Butter,	7,326,745	9,350,716
Lard,	6,504,300	4,279,400
Wool,	4,363,688	6,221,913
Hides,	880,201	528,874
Vegetable Food—		
Flour, barrels,	1,909,312	2,679,180
Wheat, bushels,	4,070,812	6,550,261
Rye,	50,293	105,354
Corn,	1,468,836	3,930,272
Barley,	98,557	110,458
Other grain,	250,010	450,003
Bran and ship stuffs,	821,413	1,385,827
Peas and beans,	13,972	16,278
Potatoes,	9,607	3,805
Dried fruit, pounds,	292,208	1,132,162
All other Agricultural Products—		
Cotton, pounds,	252,983	516,275
Tobacco,	2,669,536	1,196,071
Clover and grass seed,	1,159,108	2,600,673
Flax seed,	972,271	2,708,247
Hops,	50,821	141,684
Manufactures.		
Domestic spirits, gallons,	358,216	952,351
Leather, pounds,	1,642,961	1,123,265
Furniture,	1,623,395	1,480,656
Bar and pig lead,	692,224	371,592
Pig iron,	182,144	506,368
Bloom and bar iron,	325,916	81,160

Manufactures.		
Iron ware,	109,478	111,158
Domestic woollens,	129,218	132,075
Domestic cottons,	136,594	130,818
Salt, barrels,		334,836
Merchandise—		
At 8 mills, pounds,	461,905	290,960
At 5 mills, viz:		
Sugar,	5,212	15,610
Molasses,		8,039
Coffee,		1,920
Nails and spikes,		6,404
Iron and steel,	2,970	64,990
Crockery,		4,895
Oysters and clams,		800
Other Articles—		
Stone, lime and clay,	7,881,004	14,759,945
Gypsum,	140,310	
Mineral coal,	3,286,162	1,662,133
Sundries,	13,693,803	19,190,233
Other articles,	10,970	17,786
Total tons,	627,502	914,888

Albany Evening Journal.

TRADE AND COMMERCE OF ST. LAWRENCE COUNTY.

Domestic Produce shipped in 1847.

	Quantity.	Value.
Wheat flour, barrels,	3,479	$20,874 00
Rye, bushels,	12,501	7,500 60
Barley,	2,407	962 80
Oats,	2,129	532 25
Indian corn,	1,079	539 50
Pots and pearls, barrels,	3,719	74,380 00
Pig iron, tons,	515	15,450 00
Bar iron,	4	400 00
Staves and heading, thousands,	261	1,566 00
Sawed shingles,	6,699	13,380 00
Sawed lumber, feet,	4,477,243	35,817 94
Hops, pounds,	167,400	16,940 00
Wool,	43,560	12,196 86
Starch, casks,	500	9,400 00
Spirits from grain, gallons,	8,160	2,040 00
Sheep pelts, number,	15,020	6,759 00
Flour barrels,	2,237	626 36
Hoops, thousands,	75	262 50
Beer, barrels,	125	625 00
Butter, pounds,	930,400	130,256 00
Cheese, (in casks,)	1,121,700	67,302 00
Do. (in boxes,)	63,840	3,830 40
Total value,		$421,641 21

Ogdensburgh Republican.

LAKE BUSINESS OF OSWEGO.

The following tables containing a statement of the domestic and foreign imports, together with the exports of merchandise, and salt at the port of Oswego during the year 1847, is given as follows in the Times of that place:

Domestic and Foreign Imports combined.

Lumber, feet	33,715,224	$307,451	16
Timber,	17,500	1,571	21
Wheat, bushels,	3,280,537	4,009,555	21
Corn,	914,440	566,952	80
Barley,	112,004	69,042	48
Rye,	41,325	31,820	25
Oats,	37,580	11,649	80
Beans and peas,	5,275	7,156	23
Seed,	13,252	21,414	25
Flour, barrels,	153,286	961,137	75
Corn meal,	15,275	61,750	75
Pork,	13,871	208,161	50
Beef,	7,681	49,926	59
Fruit,	5,529	5,758	75
Fish,	1,127	6,193	50
Eggs,	1,117	13,404	50
Ashes, casks,	6,571	197,130	50
Starch,	1,191	35,730	41
Tallow,	5,512	19,242	50
Whiskey,	1,693	15,247	53
Oil,	354	12,563	12
Wool, pounds,	298,756	68,713	88
Butter,	2,495,456	374,313	40
Cheese,	4 856,591	365,271	92
Lard,	693,741	54,599	28
Hams,	302,657	20,165	70
Oil meal,	157,131	28,283	40
Grindstones,	786,341	23,605	23
Pig iron, tons,	568	19,880	75
Limestone,	571	1,713	50
Coal,	1,202	8,427	12
Shingles, number,	10,257,121	30,771	36
Hides,	8,701	33,804	75
Hoops,	1,728,756	1,728	75
Skins, bales,	1,712	17,120	25
Cotton,	417	12,510	20
Hemp,	781	12,955	75
Paper,	5,112	12,780	50
Broom corn,	271	6,775	50
Feathers,	758	379	50
Dry goods, boxes,	653	87,501	75
Glass,	6,211	21,705	50
Candles,	631	2,839	56
Leather, rolls,	871	41,808	56
Lead, pigs,	1,987	6,457	50
Tobacco, hogheads,	201	12,[illegible]61	75

Cedar, cords,	1,891	4,727 50
Sundries, packages,	537	53,750 75
Hops, bales,	4,143	111,861 06
St. Ube's salt, bushels,	5,741	1,492 66
Total value,		$8,090,576 33

Value of domestic imports,	$7,798,863 69
" foreign " paying duty,	115,237 84
" " " warehoused,	176,474 89
Total value of foreign and domestic imports,	$8,090,576 33
Amount of duty collected,	22,905 63
" " bonded,	35,294 96
" " collected in 1846	12,159 55
" " " 1847	22,905 68
Excess in favor of 1847,	10,746 13

Leading articles of Importation as compared with '46.

	1846.	1847.
Lumber, feet,	28,838,232	33,715,224
Shingles, number,	4,338,850	10,257,121
Staves,	1,247,357	1,312,507
Wheat, bushels,	2,576,241	3,286,537
Corn,	354,372	914,440
Barley,	86,091	112,004
Rye,	51,410	41,325
Oats,	48,478	37,580
Flour, barrels,	72,912	153,236
Beef,	7,512	7,631
Pork,	12,374	13,871
Whiskey, casks,	2,315	1,693
Starch,	874	1,194
Ashes,	7,602	6,571
Tobacco, hogsheads,	192	201
Glass, boxes,	6,158	6,211
Pig iron, tons,	476	563
Wool, pounds,	331,078	298,756
Butter,	2,664,553	2,495,456
Cheese,	4,868,026	4,856,591
Lard,	254,201	693,741
Hams,	299,139	391,657
Corn meal, barrels,	138	15,275

	1846.	1847.
Value of domestic imports,	$4,963,298 21	$7,798,863 69
" foreign "	74,810 71	291,712 61
Total value of imports,	5,038,108 92	8,090,567 33
Excess in favor of 1847,		$3,052,467 41

Exports.

Number of lbs. merchandise, &c., exported to Western ports,	71,812,575
" " " State "	81,472,325
" " " Canada "	15,017,920
Total number of pounds exported,	168,303,020
Value of merchandise, &c.,	$9,583,805 35

Number of barrels of salt exported to Western ports,........	266,180
" " " State "	32,185
" " " Canada "	53,375

Total number of barrels exported,................	351,740
" sacks "	43,992
Value of salt exported,........................	$393,437 80

Number of barrels salt exported in '46,.......	300,810	1847,	351,740
Number of sacks " "	29,522	"	43,992

Val. of merchandise, &c., exported coastwise and foreign,	$9,503,805 35
" salt " "	393,437 80
Total value of foreign and domestic exports,.......	$9,977,243 15

By &c. in the above is meant coal, gypsum, waterlime and other articles of same nature, exclusive of salt.

Business of the port of Genesee during the past year of lake navigation, ending January 1st, 1848.

	Imports.	Domestic exports.	Foreign exports.
Total,................	$21,365 28	$214,046	$107,471

During the past year, there has been imported, $29,500 in specie. The amount received during the previous two years was only a few hundred dollars. The total imports and exports for the year, were in 1846:

	Imports.	Exports.
Total,...........................	$9,096 97	$173,830 03

The exports of domestic produce are chiefly the manufacture of Rochester and the products of the district.

The accounts of the years 1845 and 1846 of the imports and exports, stand as follows:

Imports for 1846,..................................	$9,096 97
Imports for 1845,..................................	9,044 57
Excess this year over last,........................	$52 40
Exports for 1845,.................................	$209,956 81
Exports for 1846,.................................	203,830 03
Excess of exports last year over this,...............	$6,126 78

Rochester Daily Advertiser.

LAKE IMPORTS AT BUFFALO FOR A SERIES OF YEARS.

The principal articles received at this point via the lake from the opening to the close of navigation for the past five years, were as follows:

	1843.	1844.	1845.	1846.	1847.
Flour, barrels	917,621	915,100	746,750	1,375,500	1,857,000
Pork	41,984	51,482	28,930	40,200	42,000
Beef	25,342	28,450	28,130	28,252	38,900
Seed	12,246	15,476	13,840	17,640	22,536
Ashes	29,940	29,332	32,900	24,612	7,338
Whiskey	8,719	6,315	11,750	15,031	18,100
Cranberries	3,281	3,338	4,220	2,150	3,147
Fish	2,857	2,792	3,755	6,498	3,943
Tallow	2,387	2,570	2,565	4,045	3,015
Hams and bacon, casks	4,814	6,170	2,925	3,800	2,100
Hides	32,447	29,080	43,590	50,620	64,280
Hemp, bales	865	235	2,620	26,021	1,062
Tobacco, hogsheads	2,097	262	702	3,022	1,114
Lead, pigs	27,753	6,276	14,810	25,960	16,748
Staves, M	4,522	6,543	8,573	10,762,500	8,800,000
Wheat, bushels	1,827,241	2,177,500	1,770,740	4,745,000	6,489,100
Corn	223,963	137,978	54,200	1,445,308	2,862,300
Oats	2,489	18,017	23,100	290,000	446,000
Rye	1,332	1,617	1,170	28,250	70,787
Butter, kegs	17,402	17,427	19,975	70,198	101,584
Lard	10,464	8,223	15,220	6,100,000	3,436,000
Lard, barrels	14,125	8,553	16,185	21,100	29,223
Wool, bales	4,516	12,340	7,200	25,480	30,840
Cheese, boxes	9,863	13,206	20,667	5,415	6,450
Cheese, casks	3,664	2,630	2,950	9,665	11.842
Brooms, dozen	2,128	1,280	2,335	2,550	3.462
Furs and skins, packages	2,343	2,560	3,560	4,120	5,640
Glass, boxes	2,298	3,624	3,250	420	672
Shot, kegs	275	368	350	2,290	3,857
Pig iron, tons	1,000	1,915	2,390	4,430	7,716
Coal	1,000	1,524	3,936	1,142	1,542
Nails, kegs	478	852	1,232	1,020	1,256
Paper rags, bales	261	570	840	9,098	4,960
Leather, rolls	308	1,763	5,268	781	2,685
Lard and other oils, barrels	1,316	1,663	1,140	611	842
Beeswax, packages	282	420	780	3,120	4,100
Beans, barrels	342	484	840	642	856
Ginseng, packages	304	380	520	4,842	5,640
Starch, boxes	104	3,283	3,194	643	892
Bandles	101	432	246	1,970	2.856
Feathers, sacks	1,153	1,416	2,778	1,864	3,200
Dried and other fruits, packages	735	920	1,242	6,480	6,900
Live hogs	5,221	4,773	1,860	8,642	2.430
Bacon and hams, tierces	12,150	24,960	9.330	34,536	17,318
Lumber, M feet	....	....	9,655	....	....

From the Cleveland Herald.

BUSINESS OF CLEVELAND.

Statement of some of the principal articles of property that arrived at, or were cleared from Cleveland, by way of the Ohio canal, during the years 1846 and 1847:

Arrived.

	1846.	1847.
Flour, barrels,	358,355	644,913
Pork,	42,996	16,641
Whiskey,	17,774	29,310

	1846.	1847
Linseed oil,	967	1,512
Pot and pearl ashes, pounds,	660,983	158,692
Butter,	1,341,333	2,203,705
Bacon,	1,494,821	1,596,458
Lard,	1,073,444	1,040,437
Tallow,	177,452	190,178
Iron and nails,	11,527,908	15,103,563
Wool,	970,709	1,443,428
Mineral coal, bushels,	893,806	1,238,622
Corn,	527,270	1,381,291
Oats,	50,183	54,764
Wheat,	1,672,340	2,130,317
Tobacco, hogsheads,	2,031	521
Staves and heading, pounds,	719,397	274,701
Stone, perches,	8,690	8,854
Wood, cords,	5,080	5,391
Cleared.		
Salt, barrels,	58,592	37,570
Lake fish,	9,042	10,283
Merchandise,	10,786,129	15,052,020
Furniture and baggage,	863,252	755,409
Gypsum,	1,416,578	2,563,909
Castings,	638,485	1,034,156
Machinery,	134,475	211,087
Ohio saleratus,	185,869	422,988
Pot and pearl ashes,	170,826	334,740
Other salts of ley,	263,038	143,914
Marble,	1,028,107	1,085,783
Hides and skins,	23,362	147,214
Clocks,	127,432	107,553
Grindstones,	37,656	28,258
Lumber, feet,	2,497,008	3,132,067
Shingles,	1,913,250	2,939,400
Split hoops,	1,473,680	1,598,120

TRADE OF CLEVELAND.

Abstract of exports coastwise from the port of Cleveland, during the season of navigation, 1847:

Quantity.	Species property.	Value.
701,870	barrels flour,	$3,669,455
18,095	“ pork,	242,729
2,066,484	bushels wheat,	2,476,457
1,423,669	“ corn,	711,834
5,815	packages, 498 tons merchandise,	473,475
20,221	barrels whiskey,	161,768
18,838	kegs and barrels butter,	155,650
4,187	“ “ lard,	41,870
916	thousand staves,	34,730

Quantity.	Species property.	Value.
1,462	rolls leather,	61,060
861	casks bacon,	43,050
4,085	tons iron,	245,100
9,060	bales wool,	407,700
8,131	tons coal,	16,256
12,537	kegs nails,	43,660
78,969	bushels rye and oats,	23,690
	Unenumerated articles,	344,904
		$9,244,258

Custom House, Cleveland, Jan. 1, 1848.

COMMERCE OF SANDUSKY.

The Sandusky Mirror gives the following table of the shipments to American ports from that place, for the year, ending September, 30, 1847:

Wheat, bushels,	1,818,744	Dried fruit, barrels,	397
Corn,	322,265	Eggs,	477
Flour, barrels,	133,066	Hogs, number,	1,478
Pork,	10,150	Fur, sacks,	67
Lard,	1,175	Feathers,	137
Seeds,	11,313	Staves, thousands,	67,759
High wines,	2,815	Beef, barrels,	610
Ashes, casks,	1,867	Beef hides, number,	497
Wool, pounds,	634,106	Corn meal, barrels,	85
Tobacco, hogsheads,	87	Rye meal,	408
Butter, kegs,	9,464	Beeswax,	13
Tallow, barrels,	2,405	Plaster, (estimated) tons,	1.000
Cranberries,	339	Stone,	6,500
Leather, rolls,	1,204	Miscellaneous,	30.000

COMMERCE OF MILAN, OHIO.

Exports from Milan, via the Milan canal, during the years 1846 and 1847:

	1846.	1847.
Wheat, bushels,	650,229	917,880
Corn,	17,844	137,935
Oats,	....	48,513
Ashes, barrels,	1,521	1.136
Pork,	4,459	3,385
Flour,	1,257	7,182
Beef,	171	....
Corn meal,	....	285
Lumber, feet,	64,000	333,000
Staves,	414,000	1,005,000

We are not able to give the actual value of these exports, but from a cursory estimate, we feel entirely safe in putting them at $1,250,000.

Tribune.

MICHIGAN.—COMMERCE OF MONROE.

The following table for 1847 *exhibits the exports and imports, according to the Advocate, of the port of Monroe, to which we add the exports for* 1846.

Exports.	1847.	1846.
Flour, barrels,	156,828	155,108
Wheat, bushels,	222,592	372,847
Corn,	2,973	4,808
Beans, casks,	84	bush. 290
Pork, barrels,	1,197	189
Ashes, pounds,	840,500	1,182,000
High wines, casks,	328	40
Cranberries, barrels,	414	154
Timothy seed,	182	14
Wool, sacks,	767	lb. 84,424
Hides, bundles,	3,812	lb. 90,524
Skins,	252	
Wax, pounds,	8,936	1,312
Stoves,	16,259	25,000
Lumber, feet,	264,561	158,000
Barley, bushels,	2,080	300
Furs, bales,	......	40
Buckwheat flour, barrels,	......	75
Brooms,	......	732
Potatoes, bushels,	......	377
Oats,	......	600
Rye,	180	
Beef, barrels,	1,000	
Butter, pounds,	20,668	
Lard,	13,031	
Tallow,	2,650	
Shorts,	98,000	
Furniture,	128,529	
Hams,	65,963	
Straw hats, sacks,	12	
Starch, barrels,	90	
Cider,	20	
Apples,	40	
Quinces	8	
Ginseng, pounds,	1,800	
Merchandise,	28,670	
Wrapping paper, reams,	863	
Rags, sacks,	86	

The total value of exports in 1846 was put down at $800,241 06. The exports of flour in 1847, is an increase of 1721 barrels; while the decrease in wheat amounts to over 150,000 bushels, or equivalent to over 28,000 barrels flour.

Imports—1847.

Merchandise, pounds,	5,995,621	Lard, barrels,	8
Furniture,	138,938	Lime water,	57
Iron and steel,	471,599	Stone ware, gall.	6,31[illegible]

Stoves and castings,.....	165,363	Wagons, pounds,.......	3,400
Leather,...............	41,287	Treading machines,......	3
Mill and grindstones,....	29,000	Oakum, bales,..........	112
Coal, tons,.............	130	Car wheels, pairs,.......	23
Pig iron,...............	23	Mill stones,............	4
Marble,................	12	Pine lumber, feet,.......	124,000
Cider, barrels,...........	63	Shingles, M.............	237
Beer,..................	269	Salt, barrels,...........	9,237
Fish,..................	12	Apples,................	627
Fruit, dry,..............	10	Nails, kegs,............	710
Wagons,...............	24	Locomotives,...........	2

COMMERCE OF TOLEDO, &c.

We were favored this morning with a list of tolls for the coming season, as agreed upon by the board of public works of this state, and Charles Butler, Esq. in behalf of the bond holders of the state of Indiana. The tolls for the coming year will be the same as last; from Lafayette, Indiana, on beef, bacon, pork, lard, flour, and whiskey, viz. $2 50 per ton. On wheat, from the same point, $7\frac{3}{4}$ cents per bushel; and on corn, $3\frac{7}{10}$ cents per bushel. On merchandise passing from the Lake to Lafayette, Indiana, the toll per 100 pounds, is increased 6 cents over the high rates charged last season, being now $44\frac{4}{10}$ cents against $38\frac{3}{10}$ cents the previous rate.

The following table exhibits the quantity and value of exports, during the season of 1847. The table is sufficient to prove, that no town of equal population in the United States, does an equal commercial business with Toledo.

TOLEDO.

	Quantity.	Value.
Flour, barrels,..........................	190,090	$950,450
Linseed oil,...........................	55,629	34,500
Pork,................................	18,861	339,498
Salt,.................................	59,870	74,838
High wines,...........................	6,956	43,820
Cranberries,...........................	......	......
Wheat, bushels,........................	962,170	914,061
Barley,..............................	1,405	903
Corn,................................	1,175,410	484,656
Rye,.................................	7,482	4,639
Oats,.................................	17,098	4,274
Seeds, grass...........................	2,332	4,664
Flaxseed,.............................	18,209	13,657
Beans,...............................	635	635
Butter, pounds,........................	343,602	41,868
Baggage and furniture,..................	1,073,174	536,587
Bacon,...............................	2,255,825	157,908
Cheese,..............................	101,224	8,113
Coffee,...............................	1,192,665	107,350
Cotton,..............................	509,232	30,554
Candles, lard,.........................	56,746	17,590

	Quantity.	Value.
Eggs,	111,103	$6,607
Dried fruit,	28,858	866
Undried "	159,193	1,502
Feathers,	27,516	6,879
Furs and peltries,	170,059	125,000
Ginseng,	93,595	23,398
Grease,	67,233	2,689
Grindstones,	71,346	713
Gypsum,	58,057	290
Glassware,	308,867	15,532
Hemp,	456,145	4,502
Skins,	112,340	11,234
Lard,	1,888,667	113,320
Leather,	313,644	94,093
Machinery,	618,818	300,409
Merchandise,	12,081,986	3 624,596
Nails and spikes.	310,193	24,815
Ashes,	591,385	35,483
Starch,	26,606	1,596
Sugar,	881,653	79,348
Tallow,	429,138	21,457
Leaf tobacco,	482,830	33,798
Manufactured do.,	239,567	28,868
Wool,	146,437	43,932
Crockery,	503,389	25,169
Iron,	1,102,092	47,944
Hides,	......	....
Beeswax,	......	....
Shorts, tons,	......	....
Sundries, pounds,	346,716	17,336
Clocks, number,	275,457	826,371
Lumber,	1,592,813	156,281
Straw hats, bales,	......	....
Other articles not named	......	128,934
		$9,485,493

Toledo Blade, February 25

COMMERCE OF GRAND HAVEN.

The first vessel arrived March 26th; the last one cleared December 2d. The amount and articles of export from that port were as follows:

Pine lumber, thousand feet,	24,789	$148,788
Shingles, thousands,	12,782	19,173
Wood, cords,	450	675
Shingle bolts,	460	3,680
Pine spars,	44	1,320
Square timber, thousand feet,	120	6,200
Staves, thousand,	220	1,760
Cedar posts,	4,500	180

Hemlock bark, coras,	330	$1,650
Laths, bundles,	4,000	1,200
Maple sugar, barrels	31	775
Furs, packs,	53	8,000
Potash, tons,	17	1,428
Pails, dozen,	350	1,050
Flour, barrels,	5,800	29,000
Wheat, bushels,	24,500	22,225
Beans,	140	140
Rags, tons,	5	150
Pork, barrels,	41	491
Plaster,	2,200	3,300
Wool pounds,	1,600	480
Smoked deer skins,	300	600
Saleratus, pounds,	1,000	100
Leather, tons,	10	6,000
Potatoes, bushels	500	187
Grass seed, barrels,	9	45
Amounting to		$258,597

And being the surplus produce for one year of the counties of Ionia, Kent and Ottawa.

The value of merchandise imported during the season of 1847, is estimated at	$180,000
Farming implements and immigrants' baggage,	40,000
	$220,000

From the Buffalo Commercial Advertiser

EXPORTS AND IMPORTS OF ST. JOSEPH, 1847.

Exports.

Wheat, bushels,	158,848
Corn,	5,698
Flour, barrels,	146,128
Corn meal,	3,903
Pork and lard,	2,522
High wines, casks,	3,496
Ashes,	204
Sundries, barrels bulk,	1,593
Hides,	1,178
Castings and pig iron, tons,	275
Wool, bales,	48

There was a large amount of lumber, shingles, staves, wood, &c.

Imports.

Merchandise, pounds,	3,459,971
Furniture, &c. barrels bulk,	1,624
Salt, barrels,	9,137
Coal, coke, &c. tons,	240

Exports and Imports of Michigan City.—The following is a statement of the exports and imports of Michigan city, Indiana, for the year 1847: For the year ending September 1st, 1847, over 500,000 bushels of wheat, 96,000 bushels corn and oats, 3,000 barrels beef and pork, 75 sacks wool, &c. have been shipped. 3,000 tons merchandise have been received. There were 196 arrivals of sail vessels, 12 of propellers, and 144 of steamers.

ILLINOIS.—COMMERCE OF CHICAGO.

Table showing the export of leading articles from Chicago in six years, from 1842 to 1847, inclusive:

	Wheat, Bushels.	Flour, Barrels.	Beef and Pork, Barrels.	Wool, Pounds.
1842	586,907	2,920	16,209	1,500
1843	628,967	10,786	21,492	22,050
1844	891,894	6,320	14,038	96,635
1845	956,860	13,752	13,268	216,616
1846	1,459,594	23,045	31,224	281,222
1847 (Nov. 1,)	1,974,304	32,538	48,920	411,488

Table exhibiting the amount of goods, wares and merchandise received at Chicago, from the opening of navigation in the spring of 1847, to November 1st, near the close of navigation, 1847—not including goods landed here and taken to the interior:

Dry goods,	$837,452
Groceries,	506,027
Hardware,	148,811
Iron and nails,	88,275
Stoves and hollow-ware,	68,612
Crockery,	30,505
Boots and shoes,	94,275
Hats, caps and furs,	68,200
Jewelry, &c.,	51,000
Books and stationary,	43,580
Printing paper,	7,284
Presses, type and printing materials,	7,432
Drugs and medicines,	92,081
Paints and oils,	25,460
Liquors,	86,334
Tobacco and segars,	3,716
Ship chandlery,	23,000
Tools and hardware,	15,000
Furniture trimming,	5,564
Glass,	8,949
Scales,	4,044
Coaches, &c.,	1,500
Looking glasses, &c.,	2,500
Marble,	800
Oysters,	2,500
Sportsmen's articles,	5,000
Musical instruments,	6,426
Machinery, &c.,	30,000
Value of imports of merchandise,	$2,259,309

Salt, barrels,	24,817	Coal, tons,	15,782
Salt sacks,	5,537	Water lime, bushels,	1,618
Value,			$117,201 29

And numerous other articles not here enumerated, such as pig iron, white fish and trout, fruit, grindstones, cider, &c., the precise quantity not known, but in considerable amount.

Table showing the amount of lumber, &c., received at Chicago from the opening of navigation to November 1st, 1847.

Plank, boards, &c., feet,	32,118,225	Shingle bolts, cords,	328
Shingles, thousands,	12,148,500	Tanners' bark,	600
Lath,	5,655,700	Staves,	50,000
Square timber, feet,	24,000	Spokes,	100,000
Total value			$265,332 50

Table exhibiting the exports from the port of Chicago, from the opening of navigation, 1847, *to November 1st*, 1847.

Wheat, bushels,	1,974,304	Flax seed, bushels,	2,260
Flour, barrels,	32,598	Mustard seed,	520
Corn, bushels,	67,315	Timothy seed,	536
Oats,	38,892	Hay, tons,	415
Beef, barrels,	26,504	Cranberries, bushels,	250
Pork,	22,416	Buffalo robes, bales,	69
Hams and shoulders, lbs.	47,248	Dry hides,	8,774
Tallow,	208,435	Deer skins, pounds,	28,258
Butter,	47,536	Sheep pelts,	1,133
Beans, bushels,	430	Furs, packages,	278
Wool, pounds,	411,088	Ginseng, pounds,	3,626
Tobacco,	28,243	Ashes, barrels,	15
Lard,	139,069	Bristles, pounds,	4,548
Leather,	2,740	Glue,	2,480
Beeswax,	5,490	Brooms,	3,168
Oil, gallons,	8,793	White fish, barrels,	1,229
Lead, pounds,	10,254	Barley, bushels,	400
Hemp,	6,521		
Value			$2,296,299

Besides a large amount of merchandise, produce, provisions, grain, horses, cattle, salt and supplies of all kinds sent to the lumber and mining regions, and different parts on the upper and lower lakes.

Table showing the value of exports and imports to and from Chicago, from 1836 *to* 1847, *inclusive :*

	Exports.		Imports.
1836	$1,000 64	1836	$325,293 90
1837	11,065 00	1837	373,677 12
1838	16,044 75	1838	579,174 61
1839	33,844 00	1839	630,980 26
1840	228,635 74	1840	564,106 20
1841	348,862 24	1841	563,247 88
1842	659,305 20	1842	664,347 88
1843	682,210 85	1843	971,849 75

	Exports.		Imports.
1844	785,504 23	1844	1,686,416 00
1845	1,543,519 85	1845	2,043,445 73
1846	1.813,268 00	1846	2,027,150 00
1847	2,296,299 00	1847	2,641,825 52

From the Milwaukee Sentinel.

COMMERCE OF WISCONSIN.

Southport.

Exports.		Imports.	
Wheat, bushels,	282,000	Merchandise, pounds,	3,122,000
Beef and pork, barrels,	2,028	Salt, barrels,	4,205
Flour,	612	Sundries,	7,150
Hides, pounds,	113,626	Lumber, feet,	4,365,000
Wool,	27,977	Shingles,	1,100,000
Sundries,	48,050	Valuation,	$477,460.
Valuation,	$305,635		

Racine.

Exports.		Imports.	
Wheat, bushels,	480,000	Merchandise, pounds,	4,850,000
Flour, barrels,	5,430	Lumber, feet,	4,534,000
Beef and pork,	4,700	Shingles,	2,500,000
Hides, bales,	5,540	Valuation,	$546,590
Wool, pounds,	70,400		
Sundries,	55,000		
Valuation,	$496,590		

Milwaukee.

Exports.		Imports	
Wheat, bushels,	598,011	Merchandise, pounds,	15,231,540
Flour, barrels,	34,840	Salt, barrels,	28,811
Beef and pork,	742	Sundries,	29,163
Hides,	12,961	Lumber, feet,	18,111,352
Lead, pounds,	1,560,691	Shingles,	8.616,100
Wool,	43,215		
Sundries,	171,951		

Twin Rivers

	Exports.		Exports.
White fish, barrels,	2,946	Lumber, feet,	4,981,111
Shingles, thousand,	1,333	Lath,	1,947,000
Shingle bolts, cords,	1,090	Valuation,	$53,747

No return of imports.

Port Washington and Sheboygan.

From these ports, as from Manitowoc and Green Bay, we have no returns, either of exports or imports.

Recapitulation.

Exports.		Imports.	
Wheat, bushels,	1,360,000	Merchandise, pounds,	22,838,540
Flour, barrels,	40,882	Salt, barrels,	38,011
Beef and pork,	7,362	Lumber feet,	27,010,352
Hides,	23,581	Shingles,	12,216,100
Lead, pounds,	1,150,649		
Ashes,	127,435		
Wool,	141,592		
Sundries,	245,951		
Lumber, feet,	6,928,000		
Shingles,	1,333,000		
Bolts, cords,	1,202		
White fish, barrels,	2,946		
Valuation,	$1,616,543		

Vessels.—In Commission—1 bark, 4 brigs, 38 schooners. Tonnage 6,078.
Building—1 bark, 1 brig, 8 schooners. Tonnage 1,895.
Total—59 vessels of 8,548 tons.

COMMERCE OF SOUTHPORT.

Exports.		Imports.	
Wheat, bushels,	282,808	Merchandise, tons,	1,561
Oats,	431	Merchandise and sundries bales,	4,810
Barley,	188	Salt,	4,205
Potatoes,	2,500	Whiskey,	641
Corn,	1,411	Apples and cider,	1,950
Beans,	266	Ploughs, number,	163
Beef and pork, barrels,	2,028	Wagons and carriages,	180
Flour,	612	Rakes,	2,533
Butter, pounds,	13,784	Lumber, feet,	4,365,000
Hides,	109,381	Shingle bolts, cords,	275
Mustard seed,	49,800	Shingles,	1,100,000
Wool,	26,797	Valuation,	$477,066
Merchandise,	24,000		
Merchandise and sundries,	763		
Lard and tallow,	16,500		
Rags,	2,455		
Wagons,	5		
Wheat in store at close of navigation, bushels,	42,000		
Flour, do. do. barrels,	350		
Valuation,	$305,035		

Total valuation of imports and exports, ... $782,101

ILLINOIS.—COMMERCE OF LITTLE FORT.

The following is a detailed statement of the business of Little Fort for the past two years:

Imports.	1846.	1847.
Merchandise, tons,	619	724
Furniture,	1,959	2,405

Imports.	1846.	1847.
Machinery, pounds	22,081	31,386
Salt, barrels,	700	1,624
Flour,	503	191
Apples,	342	752
Water lime,	....	95
Lumber, feet,	3,105,523	3,455,654
Shingles, thousands,	316	300
Shingle bolts, cords,	33	150
Wagons, number,	53	61
Exports.		
Wheat, bushels,	181,022	167,878
Oats,	7,757	7,634
Corn,	1,856	1,278
Barley,	1,000	1,134
Beans,	196	103
Wool pounds,	....	5,605
Flax seed, bushels,	794	....
Butter, pounds,	6,000	7,282
Merchandise,	37,510	43,556
Pork,	....	73
Hides, number,	589	784
Shingles, thousands,	339	....
Deer skins,	....	285
Wood sold,	3,000	5,458
Arrivals, number,	319	455

MISSOURI.—COMMERCE OF ST. LOUIS.

Imports.	1847.	1846
Bacon, casks,	12,472	12.631
Beef, barrels,	10,254	12,346
Bagging, pieces,	1,432	3,299
Bale rope, coils,	10,798	5,802
Barley, sacks,	35,527	13,212
Buffalo robes, bales,	7,782	5,976
Beeswax, barrels,	759	532
Beeswax, sacks,	798	827
Corn,	478,449	352,381
Coffee, bags,	77,767	60,450
Flour, barrels,	435,019	223,670
Fish,	3,484	1,572
Fish, kits,	2,734	2,620
Hemp, bales,	81,525	34,738
Hides,	71,877	84,980
Iron, bundles,	15.695	22,651
Iron, bars,	91,513	63,712
Iron, tons,	17,016	1,716
Lead, pigs,	767,656	763,489
Cotton yarn, boxes, bags,	15,147	17,726
Lard, barrels,	31,005	24,542
Lard, kegs,	12,247	19,351

Imports.	1847.	1846.
Liquors, casks,	3,192	3,122
Molasses, barrels,	21,554	16,774
Nails, kegs,	22,589	33,303
Oats, sacks,	101,203	59,620
Oil, lard, barrels,	478	273
Oil, linseed,	485	866
Oil, castor,	332	230
Oil, sperm, casks,	180	169
Pork, barrels,	45,922	15,613
Pig, metal, tons,	2,263	2,504
Rice, tierces,	762	8,666
Sugar, hogsheads,	12,661	13,898
Sugar, barrels,	4,083	4,917
Sugar, boxes,	15,028	1,090
Salt, Turks island, sacks,	22,983	15,823
Salt, ground alum,	92,809	107,581
Salt, Kentucky, barrels,	44,380	62,189
Salt, L. B., sacks,	17,632	28,478
Seed, flax, barrels,	4,992	4,081
Spirits turpentine,	619	740
Skins, deer, bales,	2,697	1,609
Tobacco, hogsheads,	10,935	8,767
Tobacco, boxes,	9,592	6,676
Tallow, barrels,	2,217	1,754
Tar, barrels and kegs,	5,656	5,235
Wool, bales,	2,107	1,903
Whiskey, barrels,	30,247	29,832
Wheat,	97,123	81,350
Wheat, sacks,	1,222,433	743,491
Exports.		
Bacon, assorted cask,	14,085	13,641
Bacon, barrels,	4,092	4,916
Bacon, bulk, tons,	675	569
Beef, barrels,	12,798	20,113
Bagging, pieces,	3,363	4,784
Bale rope, coils,	12,632	10,016
Beeswax, barrels,	621	913
Beans,	4,490	4,468
Buffalo robes, bales,	3,879	3,630
Corn, sacks,	395,683	243,026
Flour, barrels,	448,614	359,858
Hides,	73,586	44,962
Hemp, bales,	65,752	31,352
Lead, pigs,	591,791	663,505
Lead, bar and boxes,	3,136	2,932
Lard, barrels,	39,543	26,412
Lard, kegs,	21,344	32,729
Oats, sacks,	16,956	41,176
Oil, linseed, barrels,	1,067	522
Oil, castor,	933	1,269
Oil, lard,	....	619

Exports.	1847.	1846.
Pork,	56,467	62,820
Pork, bulk, tons,	661	805
Rye, sacks,	2,250	1,167
Shot, kegs,	2,506	4,122
Skins, deer, packs,	3,700	2,162
Seed, flax, tierces,	660	1,118
Tobacco, hogsheads,	9,881	8,450
Do. Manufactured, boxes,	4,841	6,183
Tallow, barrels,	2,092	5,955
Wheat,	10,318	16,231
Wheat, sacks,	640,239	217,319
Wool, bales,	1,414	1,335

Inspections of Tobacco.

In 1843 hogsheads,	6,847
" 1844	4,447
" 1845	6,290
" 1846	3,898
" 1847	5,072

A large portion of the receipts are in the form of strips, and generally go forward direct, which in some measure accounts for the disproportion in receipts and inspections.—*St. Louis Price Current*

Comparative statement of the principal articles transported upon the Ohio canals in 1846 *and* 1847.

Canals and ports.	THE FOREST.—PRODUCTS OF THE WOODS, &c.							
	Fur and peltry, pounds.	Lumber, feet.	Shingles, number.	Timber, feet.	Barrels, empty, number.	Staves and heading, number.	Hoop poles, number.	Split and flat hoops, number.
OHIO CANAL.								
Portsmouth..........arrived 1846	550	126,382	....	19,276	8,949	73,066	45,560	....
Do..........arrived 1847	....	92,470	46,000	2,142	5,603	153,441	41,775	....
Do..........cleared 1846	11,855	27,295	228,000	3,105	1,680	....	....	....
Do..........cleared 1847	23,066	15,354	36,000	15,354	7,910	....	....	....
Chilicothe..........arrived 1846	....	222,659	295,280	15,672	11,159	32,151	13,000	7,200
Do..........arrived 1847	90	240,390	115,300	10,041	24,285	415,637	8,045	70,150
Do..........cleared 1846	923	12,227	2,000	....	4,009	20,500	14,307	....
Do..........cleared 1847	1,306	63,385	5,900	....	4,708	194,947	17,500	....
Circleville..........arrived 1846	....	128,164	137,000	....	15,392	94,838	1,673	69,400
Do..........arrived 1847	5,809	18,987	20,000	24	11,854	344,984	600	145,320
Do..........cleared 1846	1,277	40,761	40,761	....	5,552	26,000	....	5,000
Do..........cleared 1847	1,415	25,192	....	3,551	3,810	75,280	....	43,800
Columbus..........arrived 1846	990	1,278,308	218,000	2,355	....	7,000	70,807	....
Do..........arrived 1847	2,250	1,576,437	803,940	....	....	187,078	....	....
Do..........cleared 1846	1,338	6,028	6.000	....	27,764	....	....	....
Do..........cleared 1847	925	82,665	4,500	4,169	27,244	333,242	....	184,900
Carroll..........arrived 1846	....	19,725	102,000	....	1,573	....	....	....
Do..........arrived 1847	....	94,579	45,200	40	7,282	5,675	16,812	....
Do..........cleared 1846	89	87,435	5,000	....	2,038	16,525	11,875	....
Do..........cleared 1847	....	42,224	....	40	....	21,275	485	....
Newark..........arrived 1846	....	276,872	134,000	13,591	508	....	....	....
Do..........arrived 1847	....	498,632	100,500	2,478	33	....	22,000	....

Do.....cleared 1846	3,728	147,694	10,000	15,788	7,484		92	
Do.....cleared 1847	3,848	211,202		2,478	4,772		28.800	83,080
Dresden.....arrived 1846		301,177	77,500	2,706	7,063	38,098	2,765	519,600
Do.....arrived 1847		395,980	162,000	18,243	8,590	86,103	16,140	551,400
Do.....cleared 1846	692	1,500			21			
Do.....cleared 1847	3,477				1,112			
Roscoe.....arrived 1846		12,670	106,000		6,215			169,550
Do.....arrived 1847		57,056	29,400		15,109			319,140
Do.....cleared 1846	420	44,015		103	1,596		144,000	2,000
Do.....cleared 1847		44,539			905			
Dover.....arrived 1846		44,341	33,000		1,114			440,865
Do.....arrived 1847		98,600	108,000	930	20,068	20,000		514,700
Do.....cleared 1846	90	111,569		3,804	72		41,500	
Do.....cleared 1847	5,019	71,997		11,375	4,195	66,263		53,700
Massillon.....arrived 1846		545,199	568,500	520	4,309			143,376
Do.....arrived 1847		460,778	702,400		7,776	6,200		271,700
Do.....cleared 1846	815	25,030	123,550		8,679	6,500		23,372
Do.....cleared 1847	189	3,330			6,586			10,000
Akron.....arrived 1846		317,304	288,250	1,254	3,607	59,500		88,490
Do.....arrived 1847		526,607	417,700	9,474	6,026	1,000		38,628
Do.....cleared 1846	1,240	424,637	107,000		4,639	10,832		56,000
Do.....cleared 1847		603,597	10,000	6,278	16,385	59,342		63,120
MUSKINGUM IMPROVEMENT.								
Harmer.....arrived 1846		97,171		2,100	2,531	236,186	325,068	53,981
Do.....arrived 1847		81,808		3,296	1,119	352,426	242,130	67,000
Do.....cleared 1846		14,621	79,000					
Do.....cleared 1847		96,872	183,700		3,425			
McConnellsville.....arrived 1846		5,842	31,000	3,210	2,830	5,840		
Do.....arrived 1847		146,193	3,000	3,738	7,996	109,100	9,550	
Do.....cleared 1846	860	37,436		9,765	1,131	23,000	8,700	
Do.....cleared 1847	860	15,750		7,261	2,517	25,000	5,530	
Zanesville.....arrived 1846	940	315,828	121,500	43,080	4,828	189,130		237,650
Do.....arrived 1847	450	552,309	261,750	58,304	4,014	34,525	14,650	264,100

Comparative statement—Continued.

Canals and ports.	THE FOREST.—PRODUCTS OF THE WOODS, &c.							
	Fur and peltry, pounds.	Lumber, feet.	Shingles, number.	Timber, feet.	Barrels, empty, number.	Staves and heading, number.	Hoop poles, number.	Split and flat hoops, number.
Zanesville cleared 1846	209	14,450			3,152	127,300		14,000
Do cleared 1847	2,112				2,450			14,000
Dresden arrived 1846	259	9,666		129	126			
Do arrived 1847	7,058	6,900		125	38			
Do cleared 1846		247,662	121,500	12,836	4,010	10,000		334,100
Do cleared 1847		407,823	110,350	19,992	1,840	20,000		296,800
MIAMI CANAL.								
Cincinnati arrived 1846		285,250	26,000		25,155	464,820	710,394	
Do arrived 1847	150	53,602	223,000		27,508	112,358	256,280	
Do cleared 1846	28,155	2,108,960	9,693,960		8,150	23,582	69,100	
Do cleared 1847	6,216	1,763,547	1,318,380		6,451	13,502	9,025	
Hamilton arrived 1846		505,322			4,935	132,286	229,462	
Do arrived 1847		331,097	95,500		2,906	191,065	331,645	
Do cleared 1846		11,900			3,406		16,950	
Do cleared 1847								
Middletown arrived 1846		567,244	1,835,000	3,500	2,371	33,393	67,151	
Do arrived 1847		884,002	1,898,000		6,441	181,918	137,085	
Do cleared 1846		10,650	255,000		2,512			
Do cleared 1847		39,460	29,000		7,447	56,431	23,030	
Dayton arrived 1846		796,899	1,506,000		1,154			
Do arrived 1847	517	639,308	712,000		1,932			
Do cleared 1846		46,675	50,000		8,598	162,800	388,843	
Do cleared 1847		92,338			4,879	2,785		

MIAMI EXTENSION.								
Dayton....arrived 1846	....	959,672	156,000	21,518	7	399,365	536,012	14,484
Do....arrived 1847	....	1,632,755	494,000	39,279	3,673	1,046,004	596,185	....
Do....cleared 1846	....	7,857	14,000	....	297	....	....	....
Do....cleared 1847	5,386	13,802	....	....	899	....	....	....
Piqua....arrived 1846	556	79,845	348,250	1,688	1,798	484,473	282,975	1,233
Do....arrived 1847	1,025	103,513	20	960	961	337,286	244,605	....
Do....cleared 1846	13,335	530,866	30,000	19,490	34,751	1,103,417	1,476,979	29,450
Do....cleared 1847	3,020	616,516	143	36,261	27,630	2,546,372	2,397,853	32,400
Junction....arrived 1847	1,270	....	....	....	....	....	....	....
Do....cleared 1847	....	380,482	....	....	....	48,241	139,475	....
WABASH AND ERIE.								
Junction....arrived 1846	....	578,574	1,740,500	....	950	....	....	....
Do....arrived 1847	....	315,290	620,000	....	....	....	....	....
Do....cleared 1846	183,323	88,698	....	....	....	....	....	....
Do....cleared 1847	132,811	28,000	....	....	....	....	....	....
Maumee City....arrived 1846	18,548	217,742	196,000	3,937	116	84,612	....	....
Do....arrived 1847	8,234	186,457	132,000	7,043	212	50,000	....	....
Do....cleared 1846	35,981	432,426	41,000	14,137	81	98,992	4,000	....
Do....cleared 1847	9,527	239,513	32,000	10,384	185	93,296	....	....
HOCKING CANAL.								
Carroll....arrived 1846	....	20,233	54,000	....	1,862	16,528	10,910	....
Do....arrived 1847	....	78,719	7,000	40	8,059	8,625	11,672	1,800
Do....cleared 1846	....	189,480	75,500	....	1,841	9,800	12,200	....
Do....cleared 1847	....	237,445	7,000	40	8,749	19,443	4,550	1,800
Nelsonville....arrived 1846	....	8,610	1,500	....	128	....	....	....
Do....arrived 1847	....	29,586	480	....	349	....	....	....
Do....cleared 1846	72	103,668	....	....	130	....	11,710	....
Do....cleared 1847	....	123,823	....	....	238	....	10,513	....
WALHONDING CANAL.								
Roscoe....arrived 1846	....	....	....	14,529	87	....	144,000	....
Do....arrived 1847	....	....	....	....	146	....	....	....
Do....cleared 1846	....	18,000	....	....	....	5,700	....	....
Do....cleared 1847	....	10,533	....	....	....	....	....	6,000

Comparative statement—Continued

Canals and ports.	THE FOREST.—PRODUCTS OF THE WOODS, &c.							
	Wood, cords.	Woodware, Ohio, pounds.	Saddletrees, pounds.	Ashes, pot and pearl, pounds.	Saleratus, pounds.	Salts of ley, pounds.	Cut stone, pounds,	Dressed and rough stone, perches.
OHIO CANAL.								
Portsmouth..........arrived 1846	113	140	207,429	108,196	45,775	80,904	230,443	2,098
Do..........arrived 1847	191	....	251,626	117,178	23,551	53,647	147,234	590
Do..........cleared 1846	....	375	75	604	....	....	....	....
Do..........cleared 1847	....	....	1,300	....	204	....	1,023	....
Chilicothe..........arrived 1846	1,106	1,245	3,551	604	8,632	....	29,529	915
Do..........arrived 1847	1,102	....	4,039	....	14,835	....	153,645	372
Do..........cleared 1846	13	252	29	2,940	....	....	154,534	60
Do..........cleared 1847	....	....	61	....	....	13,350	182,936	250
Circleville..........arrived 1846	124	6,920	1,546	....	1,820	....	5,652	1,266
Do..........arrived 1847	153	3,844	1,589	....	4,719	....	69,049	50
Do..........cleared 1846	127	600	3,380	1,386	181	....	2,175	....
Do..........cleared 1847	83	760	88	2,628	....	....	6,500	6
Columbus..........arrived 1846	4,302	45,187	....	....	....	....	141,137	7
Do..........arrived 1847	1,219	63,128	....	....	....	....	86,931	194
Do..........cleared 1846	....	2,110	289,549	70,188	28,072	85,230	50,836	1,369
Do..........cleared 1847	....	6,467	356,859	111,019	12,695	4,391	1,104,747	112
Carroll..........arrived 1846	....	441	777	....	6,043	....	....	175
Do..........arrived 1847	½	....	3,215	....	6,433	....	....	85
Do..........cleared 1846	37	339	698	17,035	1,573	1,593	....	72
Do..........cleared 1847	98	....	30	2,112	....	....	....	75
Newark..........arrived 1846	....	1,210	720	....	1,282	....	....	3,328
Do..........arrived 1847	65	731	3,410	....	148	....	....	308

Do......cleared 1846	3,328	75	55,445	257,605	32,103			
Do......cleared 1847	62			77,481	3,598	33,710		308
Dresden......arrived 1846	783			35,968	16,137	55,523		185
Do......arrived 1847	181			11,466	12,650			58
Do......cleared 1846		2,051						
Do......cleared 1847		2,022		300				1,000
Roscoe......arrived 1846		579			2,455			
Do......arrived 1847					5,170			
Do......cleared 1846		1,229		21,483				
Do......cleared 1847				10,704				
Dover......arrived 1846	16	121	370		6,396			50
Do......arrived 1847					3,722			
Do......cleared 1846	161	135						52
Do......cleared 1847	171							
Massillon......arrived 1846	135		116	500	14,047			99
Do......arrived 1847	87		2,140		31,949			
Do......cleared 1846	135	739		39,266	659			111
Do......cleared 1847	32	223		16,281	680	5,641		1
Akron......arrived 1846	350			182,660	121,283	272,616		686
Do......arrived 1847	552			349,373	233,456	102,071		150
Do......cleared 1846		32,842		376,393	1,757	5,841		
Do......cleared 1847		143		71,315		3,216		
MUSKINGUM IMPROVEMENT.								
Harmer......arrived 1846	232	16,493		8,954	50,741	60,201		205
Do......arrived 1847	462	18,727		96,258	20,120	77,084		
Do......cleared 1846					1,905		3,200	
Do......cleared 1847				1,879	2,704			9
McConnellsville......arrived 1846	39				1,647			
Do......arrived 1847	96				1,613			
Do......cleared 1846		200			3,425	3,120		7
Do......cleared 1847								
Zanesville......arrived 1846	418	2,088	1,300	36,222	11,736	55,250	49,536	763
Do ......arrived 1847	451	1,000	153	10,556	10,918	2,620		806

Comparative statement—Continued

Canals and ports.	THE FOREST.—PRODUCTS OF THE WOODS, &c.							
	Wood, cords.	Woodware, Ohio. pounds.	Saddletrees, pounds.	Ashes, pot and pearl, pounds.	Saleratus, pounds.	Salts of ley, pounds.	Cut stone, pounds.	Dressed and rough stone, perches.
Zanesville..........cleared 1846	....	12,154	....	29,653	9,526	109,825	....	....
Do..........cleared 1847	....	20,278	....	12,592	19,594	82,216	....	....
Dresden..........arrived 1846	....	4,452	....	....	170	....	....	....
Do..........arrived 1847	....	7,420	....	....	....	....	....	....
Do..........cleared 1846	....	....	1,453	35,968	11,759	55,523	....	19
Do..........cleared 1847	14	....	....	11,459	9,876	....	....	90
MIAMI CANAL.								
Cincinnati..........arrived 1846	8,544	....	....	187,709	64,747	....	167,656	1,163
Do..........arrived 1847	6,674	....	....	124,841	6,560	....	112,194	1,068
Do..........cleared 1846	....	....	....	4,308	....	....	42,445	....
Do..........cleared 1847	....	....	....	50,517	....	....	76,946	92
Hamilton..........arrived 1846	86	....	....	....	....	....	....	890
Do..........arrived 1847	....	....	....	....	....	....	....	1,675
Do..........cleared 1846	77	....	....	....	....	....	....	....
Do..........cleared 1847	58	....	....	....	....	....	....	....
Middletown..........arrived 1846	3	....	75	....	340	....	....	206
Do..........arrived 1847	....	....	....	....	....	....	22,293	1,139
Do..........cleared 1846	393	....	....	....	....	....	....	52
Do..........cleared 1847	284	....	....	....	....	....	157	412
Dayton..........arrived 1846	....	....	....	....	....	....	....	27
Do..........arrived 1847	....	....	....	....	....	....	4,000	....
Do..........cleared 1846	101	....	....	34,507	....	....	....	1,472
Do..........cleared 1847	18	....	....	32,832	....	....	57,870	2,517

MIAMI EXTENSION								
Dayton .... arrived 1846	102							178
Do........ arrived 1847	1,195			3,634				
Do........ cleared 1846								
Do........ cleared 1847							700	15
Piqua........ arrived 1846	39			34,966	793	3,000	1,400	1,309
Do........ arrived 1847		136		25,630	53,034	6,461	10,880	
Do........ cleared 1846	74			129,890	20,699	2,660		307
Do........ cleared 1847	244			103,981	62,708	1,749		3,682
Junction........ arrived 1847								
Do........ cleared 1847				96,686				
WABASH AND ERIE.								
Junction........ arrived 1846								
Do........ arrived 1847			910		504			
Do........ cleared 1846				875,936	4,313			
Do........ cleared 1847				396,979	6,404			
Maumee City........ arrived 1846	35				200		4,400	
Do........ arrived 1847	53			11,344	823			
Do........ cleared 1846	43			243,866				
Do........ cleared 1847	96			146,339				20
HOCKING CANAL.								
Carroll........ arrived 1846	516		400		1,323			1
Do........ arrived 1847	130		2,316		2,481			125
Do........ cleared 1846	516	441	767		5,125	1,593		95
Do........ cleared 1847	325		2,366		3,188			125
Nelsonville........ arrived 1846	46	441	350		2,563			
Do........ arrived 1847	19				1,918			
Do........ cleared 1846	16							
Do........ cleared 1847			320		363			
WALHONDING CANAL.								
Roscoe........ arrived 1846	20							
Do........ arrived 1847				10,704				
Do........ cleared 1846					424			
Do........ cleared 1847					177			

Comparative statement—Continued.

Canals and ports.	PRODUCTS OF STONE, MARBLE, MINERALS, &c.							
	Marble, unwrought, pounds.	Grindstones, pounds.	Marble, wrought, pounds.	Burr blocks, pounds.	Coal, mineral, bushels.	Coke, bushels.	Potters' ware, pounds.	Gypsum, pounds.
OHIO CANAL.								
Portsmouth..........arrived 1846	....	....	16,603	....	....	....	2,400	....
Do..........arrived 1847	86,903	....	10,944	....	....	....	1,482	3,600
Do..........cleared 1846	....	7,279	....	....	22,926	24,498	2,794	1,200
Do..........cleared 1847	....	57,342	1,895	....	28,902	19,157	17,550	....
Chilicothe..........arrived 1846	3,392	1	6,049	....	92,387	5,422	....	13,460
Do..........arrived 1847	2,902	56,992	7,383	....	131,151	3,910	18,515	20,080
Do..........cleared 1846	....	....	....	....	2,586	....	....	120
Do..........cleared 1847	....	600	2,292	....	....	....	1,482	....
Circleville..........arrived 1846	93,556	1,200	715	....	17,687	2,500	8,000	3,303
Do..........arrived 1847	31,832	2,207	2,670	....	47,803	3,560	4,256	6,530
Do..........cleared 1846	2,500	....	19,448	....	5,469	....	4,486	....
Do..........cleared 1847	810	....	10,578	....	8,952	....	4,120	....
Columbus..........arrived 1846	588,425	8,467	15,225	....	92,600	7,890	....	15,685
Do..........arrived 1847	56,514	12,067	19,973	....	155,362	763	....	96,080
Do..........cleared 1846	25,377	....	6,162	....	....	....	....	....
Do..........cleared 1847	3,024	....	1,158	....	....	....	436	....
Carroll..........arrived 1846	202	2,100	111	....	26,020	500	2,000	....
Do..........arrived 1847	....	2,460	4,986	....	101,382	....	5,020	20,135
Do..........cleared 1846	202	....	116	....	203,779	....	3,328	....
Do..........cleared 1847	....	....	1,894	....	395,690	....	4,256	775
Newark..........arrived 1846	122,155	2,042	138	27,332	69,046	2,650	640	38,940
Do..........arrived 1847	104,483	....	425	38,341	121,079	8,079	680	18,263

Do.	cleared	1846	10,000		9,538		41,791		16,920	
Do.	cleared	1847	3,775		13,856		64,807			2,014
Dresden	arrived	1846	99,353	5,221	27,410		14,678	670		28,675
Do.	arrived	1847	123,176		3,560		39,700	826	3,120	24,355
Do.	cleared	1846			800		250		62,824	409
Do.	cleared	1847	6,054		81,550		4,612		367	1,960
Roscoe	arrived	1846	2,570	282	1,293		19,954		20,884	2,400
Do.	arrived	1847	2,505		3,840	2,800			58,480	7,906
Do.	cleared	1846	5,320	401	20,990		66,175		4,528	
Do.	cleared	1847					86,874		39,484	2,015
Dover	arrived	1846	93,390		5,755		2,500	1,000	5,216	10,505
Do.	arrived	1847	101,416		14,375			3,986	30,087	1,013
Do.	cleared	1846	600	265	800		38,195		2,240	
Do.	cleared	1847	8,000				45,080		24,927	
Massillon	arrived	1846	103,665	50	9,661		4,791	514	11,429	295,938
Do.	arrived	1847	116,092		1,600		3,400	922	26,011	911,749
Do.	cleared	1846			7,947		5,596	1,600	500	11,137
Do.	cleared	1847	15,540		300		1,300	4,010	20,320	5,003
Akron	arrived	1846	252,836	6,660			900			633,872
Do.	arrived	1847	201,080	6,790						1,556,003
Do.	cleared	1846	3,558	309		781	854,824	13,840	1,029,999	
Do.	cleared	1847	23,716				1,207,170	24,932	1,289,273	
MUSKINGUM IMPROVEMENT.										
Harmer	arrived	1846		600	16,857		20,753		1,491,895	
Do.	arrived	1847	10,000	58,800	16,310		16,556		921,391	
Do.	cleared	1846	1,758		718					
Do.	cleared	1847	759		1,077		113			
McConnellsville	arrived	1846			23,563		14,382		12,027	
Do.	arrived	1847			17,494		24,764		2,450	
Do.	cleared	1846		350					41,118	
Do.	cleared	1847		350					57,932	
Zanesville	arrived	1846	99,353	2,000	28,041	6,500				18,805
Do.	arrived	1847	138,731		1,700					19,985

Comparative statement—Continued

Canals and ports.	PRODUCTS OF STONE, MARBLE, MINERALS, &c.							
	Marble, unwrought, pounds.	Grindstones, pounds.	Marble, wrought, pounds.	Burr blocks, pounds.	Coal, mineral, pounds.	Coke, pounds.	Potters' ware, pounds.	Gypsum, pounds.
Zanesville..........cleared 1846	....	....	27,414	1,100	550	....	1,651,138	3,500
Do..........cleared 1847	10,000	....	39,450	....	5,462	....	1,645,169	365
Dresden..........arrived 1846	....	....	800	....	250	....	67,984	400
Do..........arrived 1847	....	....	6,070	....	5,662	....	152,016	....
Do..........cleared 1846	....	2,221	99,353	....	....	....	....	19,220
Do..........cleared 1847	122,191	....	1,625	....	....	....	....	19,985
MIAMI CANAL.								
Cincinnati..........arrived 1846	....	....	....	....	....	....	....	....
Do..........arrived 1847	....	4,800	....	....	....	....	....	....
Do..........cleared 1846	....	58,603	....	26,955	119,348	16,734	....	....
Do..........cleared 1847	....	169,633	....	....	96,357	53,430	....	....
Hamilton..........arrived 1846	....	....	....	32,245	20,210	....	....	....
Do..........arrived 1847	15,000	12,999	....	....	14,590	....	....	....
Do..........cleared 1846	....	....	....	51,035	....	....	12,100	....
Do..........cleared 1847	....	....	....	....	....	....	....	....
Middletown..........arrived 1846	....	6,888	2,113	....	8,005	....	9,753	....
Do..........arrived 1847	....	3,630	5,680	....	31,734	....	4,967	....
Do..........cleared 1846	....	....	....	....	....	....	2,680	....
Do..........cleared 1847	....	....	4,190	....	525	....	4,000	....
Dayton..........arrived 1846	....	54,062	2,200	....	33,601	20,040	4,100	....
Do..........arrived 1847	....	19,940	2,500	35,975	64,495	....	7,287	....
Do..........cleared 1846	....	....	4,557	....	....	....	....	....
Do..........cleared 1847	....	....	....	....	....	....	1,200	....

MIAMI EXTENSION.								
Dayton..........arrived 1846	24,564							
Do..........arrived 1847	68,141		25,540	45,196				
Do..........cleared 1846		1,950			613		9,690	
Do..........cleared 1847			5,515		138			
Piqua..........arrived 1846	39,860	61,040			3,782	110	28,253	
Do..........arrived 1847		20,714	3,875	7,000	5,075		2,964	
Do..........cleared 1846	660	2,943			305		6,461	
Do..........cleared 1847							9,328	
Junction..........arrived 1847		1,470			127	430	2,754	
Do..........cleared 1847	3,900							
WABASH AND ERIE.								
Junction..........arrived 1846	24,145	145,009	5,666		2,509		26,488	12,487
Do..........arrived 1847	183,262	68,842	4,306		1,257		52,085	54,380
Do..........cleared 1846								
Do..........cleared 1847								
Maumee City..........arrived 1846				3,000	200		46,211	
Do..........arrived 1847	210	20,778	1,835		2,586		8,781	2,102
Do..........cleared 1846			5,000		220		4,000	
Do..........cleared 1847							7,100	
HOCKING CANAL.								
Carroll..........arrived 1846		2,000			203,025			
Do..........arrived 1847	315		70		381,509			30,910
Do..........cleared 1846	202	2,000			7,930		4,532	
Do..........cleared 1847	315	60	70		15,552			30,910
Nelsonville..........arrived 1846	2,950						350	
Do..........arrived 1847		600					1,416	
Do..........cleared 1846					296,326			
Do..........cleared 1847					557,653			
WALHONDING CANAL.								
Roscoe..........arrived 1846							2,056	
Do..........arrived 1847								
Do..........cleared 1846			1,864		975			835
Do..........cleared 1847								10,395

Comparative statement—Continued.

Canals and ports.	PRODUCTS OF STONE, WOOD, MINERALS, &c.							
	Glass and glassware, pounds.	Iron ore, pounds.	Iron, pounds.	Iron, pig and scrap, pounds.	Iron, cast, pounds.	Lead, in pigs and bars, pounds.	White lead, pounds.	Shot, pounds.
OHIO CANAL.								
Portsmouth.................arrived 1846	....	....	2,507	46,483	37,221	....	112	....
Do.....................arrived 1847	....	....	16,106	17,415	21,112	....	....	....
Do.....................cleared 1846	160	....	1,605,639	6,155,719	172,134	9,285	68,772	9,902
Do.....................cleared 1847	160	....	1,336,598	5,745,249	141,369	19,090	79,458	8 685
Chilicothe.................arrived 1846	6,803	....	195,103	908,658	38,268	2,151	16,765	....
Do.....................arrived 1847	2,503	....	239,826	834,466	54,097	4,905	30,390	....
Do.....................cleared 1846	1,277	....	143,349	4,346	15,327	....	1,332	....
Do.....................cleared 1847	4,270	....	293,596	2,240	42,764	....	495	....
Circleville.................arrived 1846	11,088	....	223,950	59,340	86,439	....	14,589	300
Do.....................arrived 1847	10,781	....	161,894	96,320	85,459	1,512	13,710	760
Do.....................cleared 1846	2,009	....	2,969	8,213	3,867	....	550	....
Do.....................cleared 1847	2,483	....	11,917	12,480	19,811	21	836	....
Columbus.................arrived 1846	40,188	....	1,195,798	867,590	3,487	....	....	....
Do.....................arrived 1847	138,505	....	1,070,191	127,148	171,836	1,000	8,439	3,500
Do.....................cleared 1846	447	....	1,065	25,787	57,843	....	....	....
Do.....................cleared 1847	12,615	....	2,253	4,559	19,212	....	560	....
Carroll.....................arrived 1846	22,100	....	137,908	225,760	73,307	412	12,100	300
Do.....................arrived 1847	36,052	....	221,800	114,400	94,234	2,950	14,011	875
Do.....................cleared 1846	3,185	....	2,220	825	11,590	745	....	25
Do.....................cleared 1847	3,190	....	2,631	1,066	10,093	....	530	300
Newark.....................arrived 1846	6,830	627,200	447,318	382,045	90,404	470	16,918	300
Do.....................arrived 1847	8,410	730,000	574,037	575,755	110,930	6,247	32,913	3,802

Do.	cleared	1846	2,761	627,000	3,029	27,876	83,321		1,861	
Do.	cleared	1847		730,000	83,326	71,041	55,812		1,318	
Dresden.	arrived	1846	2,242		1,253	234,272	6,318		532	
Do.	arrived	1847	1,330		9,369	418,230	38,745			
Do.	cleared	1846	21,562		520,238	2,240	30,873		13,508	
Do.	cleared	1847	16,541		89,344		76,252		23,116	
Roscoe.	arrived	1846	10,046		26,123	58,800	15,002			
Do.	arrived	1847	9,485		82,508	62,720	35,626		4,892	
Do.	cleared	1846	7,905		1,651	98,136	13,456			
Do.	cleared	1847	3,878			47,913	3,809			
Dover.	arrived	1846	8,177		162,686	97,604	28,474	420	5,020	432
Do.	arrived	1847	20,006		209,311	56,140	51,987		12,792	
Do.	cleared	1846	3,665		14,746	2,921	37,548	400		307
Do.	cleared	1847	3,133	848,400	22,818	7,748	5,911			
Massillon.	arrived	1846	25,996		290,461	445,390	71,812	2,709	15,873	2,832
Do.	arrived	1847	55,992		286,994	1,058,754	310,675	9,708	46,467	3,250
Do.	cleared	1846	4,923	3,071,925	26,161	2,884,398	17,904	1,276	925	714
Do.	cleared	1847		3,709,604	9,518	2,109,257	57,196		2,333	
Akron.	arrived	1846		5,192,002	116,954	791,301	287,053		7,589	
Do.	arrived	1847		4,854,946	139,578	1,127,967	255,400		13,893	
Do.	cleared	1846			9,314,076	1,511,861	63,651	15,150	149,327	1,706
Do.	cleared	1847			10,222,870	2,733,561	93,348	40,865	240,000	43,883
MUSKINGUM IMPROVEMENT.										
Harmer.	arrived	1846	72,462		1,944	313,528	13,718			
Do.	arrived	1847	116,054		7,987	278,750	24,871			
Do.	cleared	1846			1,320,239	715,052	26,433	6,728	59,673	5,080
Do.	cleared	1847			1,589,064	770,470	41,596	21,376	97,110	5,326
McConnellsville.	arrived	1846	1,660		105,036	249,276	9,719		3,578	
Do.	arrived	1847	7,916		157,439	208,190	9,644	253	3,367	
Do.	cleared	1846	1,100		5,342	147,088	11,146			
Do.	cleared	1847	1,100			26,412	7,073			
Zanesville.	arrived	1846	1,164		1,068,845	805,190	20,963	8,256	55,141	3,500
Do	arrived	1847	250		1,557,131	1,032,940	27,831	18,742	97,762	3,850

Comparative statement—Continued.

Canals and ports.	PRODUCTS OF STONE, MARBLE, MINERALS, &c.							
	Glass and glassware, pounds.	Iron ore, pounds.	Iron, pounds.	Iron, pig and scrap, pounds.	Iron, cast, pounds.	Lead in pigs and bars, pounds	White lead, pounds.	Shot, pounds.
Zanesville..................cleared 1846	118,846	....	608,512	175,902	46,336	....	11,716	....
Do..................cleared 1847	118,464	....	737,678	310,032	117,005	205	31,061	300
Dresden..................arrived 1846	21,446	....	594,442	....	36,679	....	12,476	....
Do..................arrived 1847	14,704	....	740,140	....	100,646	....	31,250	....
Do..................cleared 1846	1,226	....	1,168	191,712	8,884	....	532	....
Do..................cleared 1847	765	....	2,566	395,560	17,571	....	....	....
MIAMI CANAL.								
Cincinnati..................arrived 1846	54,644	....	280,131	124,744	47,727	....	....	....
Do..................arrived 1847	23,674	....	204,168	17,844	68,874	....	....	....
Do..................cleared 1846	362,711	....	1,991,005	1,880,443	628,736	102,269	387,464	46,603
Do..................cleared 1847	178,977	....	136,289	....	570,290	76,595	188,601	33,318
Hamilton..................arrived 1846	....	....	127,085	119,452	67,606	....	....	....
Do..................arrived 1847	20,785	....	224,331	....	59,423	....	3,150	....
Do..................cleared 1846	....	....	....	5,530	9,490	....	....	....
Do..................cleared 1847	....	....	2,400	2,100	15,605	....	....	....
Middletown..................arrived 1846	10,510	....	79,359	53,940	41,238	1,249	3,002	305
Do..................arrived 1847	12,780	....	252,737	79,300	83,647	....	9,709	....
Do..................cleared 1846	688	....	2,672	10,179	10,840	....	....	....
Do..................cleared 1847	300	....	21,232	61,382	33,718	....	250	....
Dayton..................arrived 1846	....	....	661,992	1,005,021	101,963	....	....	....
Do..................arrived 1847	....	....	1,097,246	835,501	128,850	....	....	....
Do..................cleared 1846	....	....	....	2,747	50,725	....	....	....
Do..................cleared 1847	....	....	1,224	9,503	30,617	....	....	....

MIAMI EXTENSION.								
Dayton..........arrived 1846	....	....	2,088	....	12,000	....	....	....
Do..........arrived 1847	....	....	3,208	....	3,100	....	....	....
Do..........cleared 1846	....	....	19,414	....	....	....	....	....
Do..........cleared 1847	....	....	11,787	....	58,350	....	....	....
'qua..........arrived 1846	30,373	....	255,817	97,311	124,599	....	9,122	....
Do..........arrived 1847	44,415	....	294,353	146,483	196,102	450	4,484	....
Do..........cleared 1846	450	....	6,050	4,882	21,868	100	600	....
Do..........cleared 1847	....	....	20,534	1,200	13,682	....	....	....
Junction..........arrived 1847	94,416	....	221,481	142,530	244,135	....	51,769	....
Do..........cleared 1847	....	....	....	83,910	615	....	....	....
WABASH AND ERIE.								
Junction..........arrived 1846	183,811	....	217,560	54,000	494,951	....	11,876	....
Do..........arrived 1847	212,833	....	227,128	1,000	542,075	....	13,103	....
Do..........cleared 1846	....	....	100	....	10,136	....	1,154	....
Do..........cleared 1847	....	....	....	....	2,311	....	257	....
Maumee City..........arrived 1846	8,613	....	10,796	....	55,056	....	....	....
Do..........arrived 1847	....	....	29,045	16,470	67,916	....	695	....
Do..........cleared 1846	1,427	....	15,630	....	13,284	....	....	....
Do..........cleared 1847	....	....	5,000	....	19,431	....	....	....
HOCKING CANAL.								
Carroll..........arrived 1846	17,786	....	127,166	166,105	65,633	412	11,531	325
Do..........arrived 1847	27,919	....	228,579	137,866	61,521	2,190	14,372	850
Do..........cleared 1846	20,086	....	129,967	166,105	70,375	412	12,131	325
Do..........cleared 1847	27,919	....	228,902	137,866	76,649	2,190	14,372	850
Nelsonville..........arrived 1846	45	....	522	....	48,578	....	75	....
Do..........arrived 1847	760	....	4,464	....	25,920	....	968	....
Do..........cleared 1846	400	....	....	10,100	140	....	....	....
Do..........cleared 1847	....	....	250	....	3,100	....	....	....
WALHONDING CANAL.								
Roscoe..........arrived 1846	....	....	....	....	....	380	....	....
Do..........arrived 1847	....	....	....	....	....	....	....	....
Do..........cleared 1846	....	....	....	....	....	....	....	....
Do..........cleared 1847	13,070	....	....	....	....	....	....	....

Comparative statement—Continued

Canals and ports.	MINERALS, &c.			AGRICULTURE.—ANIMAL PRODUCTS.				
	Nails, spikes, pounds.	Salt, barrels.	Salt from Ohio river, barrels.	Pork, barrels.	Beef, barrels.	Bacon and pork in bulk, pounds.	Lard, pounds.	Tallow, pounds.
OHIO CANAL.								
Portsmouth.................arrived 1846	....	184	....	35,136	1,227	2,770,873	3,566,787	123,341
Do.................arrived 1847	107	86	....	46,575	18	2,561,515	3,267,648	28,101
Do.................cleared 1846	546,257	....	5,507	....	....	3,899	....	....
Do.................cleared 1847	633,071	....	4,245	....	....	2,040	....	700
Chilicothe.................arrived 1846	151,107	2,459	9,054	150	12	24,722	....	....
Do.................arrived 1847	225,706	2,687	11,365	361	19	66,376	22,685	334
Do.................cleared 1846	12,505	24	....	27,046	2,153	1,743,311	1,700,479	121,235
Do.................cleared 1847	23,827	85	567	31,821	480	2,226,475	2,411,048	21,823
Circleville.................arrived 1846	95,715	1,844	3,670	1	....	150	....	....
Do.................arrived 1847	66,638	1,841	2,892	348	7	728	22,685	....
Do.................cleared 1846	1,707	179	581	13,248	3	1,277,212	1,458,259	25,205
Do.................cleared 1847	6,703	84	394	7,183	....	854,848	724,882	27,072
Columbus.................arrived 1846	224,264	2,252	9,624	302	48	....	....	2,536
Do.................arrived 1847	262,811	1,432	10,514	91	....	....	14,310	....
Do.................cleared 1846	....	....	....	9,172	74	866,038	619,093	74,436
Do.................cleared 1847	....	107	....	7,557	161	859,377	510,244	74,491
Carroll.................arrived 1846	64,270	270	840	2	....	3,615	708	53
Do.................arrived 1847	112,411	826	2,962	....	....	800	28	1,785
Do.................cleared 1846	105	34	14,571	6,093	10	198,915	227,558	12,920
Do.................cleared 1847	3,005	2	8,421	1,349	....	441,047	124,217	4,521
Newark.................arrived 1846	190,167	2,223	6,823	16	2	449	960	....
Do.................arrived 1847	223 425	1,780	3,692	....	....	....	....	....

Do.	cleared	1846	4,211	81	1,550	6,249	100	505,449	293,557	17,935
Do.	cleared	1847	1,850	178	394	2,819	14	315,504	170,131	25,250
Dresden	arrived	1846	1,960	240		205		33,812	5,618	162
Do.	arrived	1847	3,115	110		116		11,913	3,628	
Do.	cleared	1846	221,106		16,738	1,868	17	47 901	81,467	24,882
Do.	cleared	1847	48,240		19,807	823		62,260		13,604
Roscoe	arrived	1846	21,190	1,533	978			407		
Do.	arrived	1847	35,062	1,073	804					
Do.	cleared	1846	108	220		1,991		30,716	62,999	
Do.	cleared	1847						3,195	45,033	
Dover	arrived	1846	87,377	6,799		20		1,067		
Do.	arrived	1847	81,220	3,782				500		
Do.	cleared	1846	11,834			3,678	13	19,620	12,052	1,631
Do.	cleared	1847	4,338	219		575		23,558	8,896	
Massillon	arrived	1846	147,125	12,228		39		8,661		
Do.	arrived	1847	256,138	8,471		112		8,639	597	
Do.	cleared	1846	29,115	596		2,008	42	72,279	69,701	11,884
Do.	cleared	1847	4,320	176		2,140		48,525	75,650	190
Akron	arrived	1846	40,557	21,293		773	9	2,803	3,742	585
Do.	arrived	1847	35,929	16,247		6	279	23,735	2,246	15,724
Do.	cleared	1846	2,785,105	244		8,322	567	288,619	33,763	5,917
Do.	cleared	1847	5,269,055			3,464	10	48,224	93,348	51,072
MUSKINGUM IMPROVEMENT.										
Harmer	arrived	1846		2,239		2,368	900	956,321	176,837	22,400
Do.	arrived	1847	1,166	834		1,443	362	1,113,812	143,267	35,287
Do.	cleared	1846	636,174		176	17		2,098		
Do.	cleared	1847	746,054		64					
McConnellsville	arrived	1846	48,906	370				340		
Do.	arrived	1847	66,458	282					260	488
Do.	cleared	1846		4,362		811	2	137,161	42,010	1,265
Do.	cleared	1847			5,101	96	11	199,481	30,964	
Zanesville	arrived	1846	473,490	17,910		73		83,349	14,812	
Do.	arrived	1847	742,023	22,222		594		87,164	14,947	

Comparative statement—Continued.

Canals and ports.	MINERALS, &c.			AGRICULTURE.—ANIMAL PRODUCTS				
	Nails, spikes, pounds.	Salt, barrels.	Salt from Ohio river, barrels.	Pork, barrels.	Beef, barrels.	Bacon and pork in bulk, pounds.	Lard, pounds.	Tallow, pounds.
Zanesville..........cleared 1846	190,875	15,438	....	1,680	294	708,720	162,372	42,831
Do..........cleared 1847	264,899	19,499	....	1,147	220	727,448	166,257	49,370
Dresden..........arrived 1846	201,410	17,836	....	831	9	34,843	62,069	24,882
Do..........arrived 1847	263,590	21,058	....	71	....	15,354	33,818	13,604
Do..........cleared 1846	....	....	....	517	4	114,997	28,293	162
Do..........cleared 1847	1,304	....	....	519	....	27,803	16,734	....
MIAMI CANAL.								
Cincinnati..........arrived 1846	38,903	1,448	....	15,501	....	3,768,299	3,251,433	92,527
Do..........arrived 1847	21,143	4,471	....	35,263	1,063	8,809,612	3,498,391	116,802
Do..........cleared 1846	645,631	8,813	....	647	1,568	1,096,269	276,705	251,459
Do..........cleared 1847	389,491	8,922	....	4,477	....	290,278	2,991,816	451,016
Hamilton..........arrived 1846	....	3,480	....	....	....	3,980	....	....
Do..........arrived 1847	26,611	3,533	....	....	....	....	....	....
Do..........cleared 1846	....	47	....	23,897	1,126	3,336,601	1,890,112	56,467
Do..........cleared 1847	....	....	....	10,038	....	2,072,475	1,417,851	13,610
Middletown..........arrived 1846	34,372	2,886	....	....	8	....	....	....
Do..........arrived 1847	54,780	1,370	....	....	....	....	....	....
Do..........cleared 1846	300	19	....	9,704	220	1,373,335	1,265,142	12,821
Do..........cleared 1847	1,364	145	....	4,634	....	1,254,149	975,853	32,245
Dayton..........arrived 1846	....	....	4,475	....	....	....	....	....
Do..........arrived 1847	....	3,760	....	....	....	10,000	....	....
Do..........cleared 1846	....	....	90	....	865	2,062,717	711,182	152,161
Do..........cleared 1847	....	117	....	330	18	1,049,758	825,727	95,963

MIAMI EXTENSION.										
Dayton	arrived	1846	...	1,407	...	...	...	...	...	...
Do	arrived	1847	...	3,846	...	...	...	2,200	...	1,205
Do	cleared	1846	...	7	...	998	...	42,622	160,596	1,800
Do	cleared	1847	...	182	...	...	...	975	34,934	250
Piqua	arrived	1846	74,968	3,529	2	...	...	10,255	32	...
Do	arrived	1847	113,810	2,950	1,472	...	...	6,605	2,008	...
Do	cleared	1846	39,451	304	...	3,023	846	425,190	235,508	35,125
Do	cleared	1847	1,898	...	...	520	3	416,003	179,752	2,246
Junction	arrived	1847	195,491	...	...	...	...	200	...	...
Do	cleared	1847	800	...	...	36	...	171,241	15,323	1,475
WABASH AND ERIE.										
Junction	arrived	1846	156,575	34,888	...	5	...	530	...	...
Do	arrived	1847	219,973	47,872	...	...	...	...	...	...
Do	cleared	1846	...	...	...	11,506	388	1,293,369	1,610,355	35,602
Do	cleared	1847	...	...	...	17,715	508	669,199	1,545,353	15,351
Maumee City	arrived	1846	19,947	2,024	...	77	...	1,800	863	...
Do	arrived	1847	22,278	1,801	...	7	...	2,179	6,422	...
Do	cleared	1846	730	317	...	269	...	11,200	122,226	494
Do	cleared	1847	...	393	...	645	5	13,147	7,641	...
HOCKING CANAL.										
Carroll	arrived	1846	62,553	10	12,285	1,658	4	70,242	57,853	11,143
Do	arrived	1847	108,640	87	8,514	660	...	90,200	41,398	122
Do	cleared	1846	67,658	20	580	1,028	2	28,436	29,375	9,575
Do	cleared	1847	109,941	87	285	294	...	71,752	32,238	122
Nelsonville	arrived	1846	2,817	67	...	11	1	3,386	...	1,653
Do	arrived	1847	3,597	19	...	31	...	9,854	...	150
Do	cleared	1846	...	15,503	...	596	4	48,748	21,512	1,616
Do	cleared	1847	...	13,102	...	1,375	...	27,851	10,476	...
WALHONDING CANAL.										
Roscoe	arrived	1846	...	...	...	1,227	8	47,916	66,617	...
Do	arrived	1847	...	...	...	852	1	...	85,174	...
Do	cleared	1846	2,360	363	871	...	...	...	...	...
Do	cleared	1847	4,577	610	600	...	...	...	...	...

Comparative statement—Continued

Canals and ports.	AGRICULTURE.—ANIMAL PRODUCTS.							
	Lard oil, pounds.	Butter, pounds.	Grease, pounds.	Cheese, pounds.	Candles, lard, pounds.	Hides and skins, pounds.	Hogs' hair, pounds.	Leather, Ohio, pounds.
OHIO CANAL.								
Portsmouth..........arrived 1846	77	115,509	9,885	263,112	....	19,096	2,648	13,841
Do..........arrived 1847	....	158,950	19,307	212,268	....	878	43,625	34,555
Do..........cleared 1846	171	4,154	....	6,231	5,913	63,052	....	5,871
Do..........cleared 1847	50	107	321	3,297	2,392	100,287	....	....
Chilicothe..........arrived 1846	10	872	....	11,261	140	23,879	....	300
Do..........arrived 1847	35	2,975	....	40,953	1,370	14,156	6,343	....
Do..........cleared 1846	1	11,595	6,451	....	38	71,766	62,140	6,760
Do..........cleared 1847	3	14,003	20,888	4,992	....	1,916	99,675	14,207
Circleville..........arrived 1846	16	70	....	4,245	447	4,937	....	906
Do..........arrived 1847	19	7,013	....	7,681	1,275	11,397	....	584
Do..........cleared 1846	1	71,918	....	449	....	21,925	28,309	2,618
Do..........cleared 1847	3	112,039	....	2,675	1,166	21,253	6,902	4,899
Columbus..........arrived 1846	....	....	....	7,119	....	....	....	....
Do..........arrived 1847	3	....	....	93	....	....	....	27,117
Do..........cleared 1846	82	35,337	....	....	....	6,418	1,200	127
Do..........cleared 1847	62	23,995	....	846	8,664	9,985	18,943	....
Carroll..........arrived 1846	2	....	580	1,705	305	13,822	....	813
Do..........arrived 1847	14	1,866	....	455	....	24,731	....	710
Do..........cleared 1846	1	70,866	2,993	162	....	1,174	3,278	3,283
Do..........cleared 1847	1	121,489	588	1,254	....	5,702	5,192	10,966
Newark..........arrived 1846	12	140	....	4,829	1,010	....	....	1,170
Do..........arrived 1847	14	729	....	419	....	460	....	....

Do.....................cleared 1846	....	140,113	....	65,635	....	743	....	....
Do.....................cleared 1847	....	229,680	2,697	17,282	....	840	....	6,654
Dresden...................arrived 1846	5	5,918	....	7,983	....	654	....	....
Do.....................arrived 1847	....	3,047	....	5,819	....	....	....	....
Do.....................cleared 1846	1	110,673	....	....	....	655	....	305
Do.....................cleared 1847	....	107,542	3,768	....	....	2,603	....	28,887
Roscoe...................arrived 1846	1	....	....	2,792	931	....	....	3,903
Do.....................arrived 1847	....	....	....	541	569	....	....	6,584
Do.....................cleared 1846	....	15,687	....	638	....	634	....	....
Do.....................cleared 1847	....	45,594	....	....	....	....	....	2,522
Dover.....................arrived 1846	1	901	....	3,991	414	....	....	....
Do.....................arrived 1847	....	....	....	5,578	452	920	....	....
Do.....................cleared 1846	1,688	189,489	....	590	57	2,374	....	2,550
Do.....................cleared 1847	....	263,792	....	535	....	3,453	....	3,413
Massillon.................arrived 1846	....	2,108	321	1,494	....	....	....	5,910
Do.....................arrived 1847	6	4,389	....	4,237	330	1,924	....	3,804
Do.....................cleared 1846	....	412,430	....	2,915	....	3,810	....	....
Do.....................cleared 1847	....	360,072	....	6,878	196	7,162	....	6,955
Akron.....................arrived 1846	5	14,540	....	....	....	13,131	....	....
Do.....................arrived 1847	11	30,827	....	....	....	82,127	....	....
Do.....................cleared 1846	299	395,362	18,678	524,335	....	9,503	....	....
Do.....................cleared 1847	211	840,435	7,696	773,880	....	11,828	....	....
MUSKINGUM IMPROVEMENT.								
Harmer....................arrived 1846	....	120,936	2,876	5,949	6,947	890	....	19,578
Do.....................arrived 1847	17	218,529	....	1,110	....	3,130	....	25,531
Do.....................cleared 1846	67	....	....	365	3,645	33,330	....	....
Do.....................cleared 1847	42	....	....	....	10,294	82,062	....	....
McConnellsville.............arrived 1846	12	....	....	167	....	5,460	....	....
Do.....................arrived 1847	5	150	....	....	357	18,572	....	5,008
Do.....................cleared 1846	....	7,250	....	....	....	....	....	....
Do.....................cleared 1847	....	17,852	....	....	....	....	....	12,642
Zanesville.................arrived 1846	62	5,754	....	6,467	....	16,701	....	....
Do.....................arrived 1847	46	3,168	....	496	....	66,159	....	6,400

Comparative statement—Continued.

Canals and ports.	AGRICULTURE.—ANIMAL PRODUCTS.							
	Lard oil, pounds.	Butter, pounds.	Grease, pounds.	Cheese, pounds.	Candles, lard, pounds.	Hides and skins. pounds.	Hogs' hair, pounds.	Leather, Ohio, pounds.
Zanesville……cleared 1846	4	211,746	......	......	......	6,990	......	19,966
Do……cleared 1847	2	218,146	......	162	......	4,539	......	21,367
Dresden……arrived 1846	6	66,609	......	......	......	655	......	......
Do……arrived 1847	......	94,388	1,808	162	375	......	......	......
Do……cleared 1846	2	8,239	......	6,784	......	5,576	......	......
Do……cleared 1847	......	4,240	......	1,082	......	2,468	......	......
MIAMI CANAL.								
Cincinnati……arrived 1846	472	225,588	10,173	27,922	......	6,078	15,053	......
Do……arrived 1847	59	163,102	67,374	48,412	......	23,319	12,000	......
Do……cleared 1846	399	128,294	......	......	71,773	208,531	190,063	......
Do……cleared 1847	310	96,600	3,930	5,531	40,684	182,952	491,551	......
Hamilton……arrived 1846	2	......	......	823	2,142	......	......	......
Do……arrived 1847	2	......	......	......	3,555	......	......	......
Do……cleared 1846	......	......	......	......	......	20,175	8,530	......
Do……cleared 1847	5	......	......	......	......	1,285	......	......
Middletown……arrived 1846	5	......	......	837	809	114,462	......	13,716
Do……arrived 1847	......	......	......	527	1,268	105,014	......	36,277
Do……cleared 1846	......	8,012	27,480	......	2,300	330	4,962	31,766
Do……cleared 1847	......	8,042	42,120	......	......	8,634	550	76,942
Dayton……arrived 1846	......	......	......	......	......	......	......	......
Do……arrived 1847	12	......	......	......	......	6,255	......	22,688
Do……cleared 1846	1,330	85,422	......	......	......	20,225	......	......
Do……cleared 1847	......	97,521	......	......	......	5,447	......	......

MIAMI EXTENSION.								
Dayton............arrived 1846	......	......	......	......	......	......	......	871
Do............arrived 1847	......	4,408	......	......	......	......	......	59,588
Do............cleared 1846	......	......	......	......	......	6,993	......	9,905
Do............cleared 1847	......	10,611	......	......	......	......	......	12,910
Piqua............arrived 1846	27	2,330	......	820	......	1,749	......	......
Do............arrived 1847	4	531	2,160	......	1,335	1,040	......	6,572
Do............cleared 1846	......	106,617	4,368	......	180	3,064	......	......
Do............cleared 1847	......	99,289	20,110	......	......	......	......	16,182
Junction............arrived 1847	32	......	......	4,543	14,066	......	......	......
Do............cleared 1847	......	21,046	......	......	......	......	450	......
WABASH AND ERIE.								
Junction............arrived 1846	......	......	......	35,138	1,431	......	......	......
Do............arrived 1847	......	......	......	19,717	......	......	......	......
Do............cleared 1846	10	76,117	13,593	590	2,758	77,671	......	......
Do............cleared 1847	......	163,293	66,024	......	......	87,457	54,853	......
Maumee City............arrived 1846	......	3,220	......	7,619	......	......	......	3,329
Do............arrived 1847	......	6,000	......	2,264	......	8,454	......	......
Do............cleared 1846	......	7,664	......	......	......	12,841	......	3,360
Do............cleared 1847	......	6,144	......	......	......	9,773	......	3,584
HOCKING CANAL.								
Carroll............arrived 1846	1	64,646	......	2,790	305	12,280	......	2,681
Do............arrived 1847	15	90,601	......	......	......	21,033	......	13,133
Do............cleared 1846	4	57,743	854	2,855	420	14,447	......	4,078
Do............cleared 1847	15	90,656	......	......	......	21,033	......	13,133
Nelsonville............arrived 1846	......	......	680	65	......	......	......	419
Do............arrived 1847	......	......	......	43	......	......	......	1,603
Do............cleared 1846	......	50	......	......	......	350	......	......
Do............cleared 1847	......	......	......	200	......	......	......	......
WALHONDING CANAL.								
Roscoe............arrived 1846	......	5,828	......	......	......	......	......	......
Do............arrived 1847	......	21,607	......	......	......	......	......	......
Do............cleared 1846	......	......	......	......	......	......	......	......
Do............cleared 1847	......	......	......	......	......	......	......	......

Comparative statement—Continued.

Canals and ports.	AGRICULTURE.—ANIMAL PRODUCTS.				AGRICULTURE.			
	Leather, unfinished, pounds.	Eggs, pounds.	Feathers, pounds.	Wool, pounds,	Flour, barrels.	Wheat, bushels.	Corn, bushels,	Meal, bushels.
OHIO CANAL.								
Portsmouth.................arrived 1846	1,922	2,254	12,341	113,780	38,742	8,004	134,032	588
Do.....................arrived 1847	6,200	22,659	15,450	48,696	71,047	8,782	348,155	14,414
Do.....................cleared 1846	5,717	....	3,656	1,716	126	28,592	....	....
Do.....................cleared 1847	....	....	1,704	1,002	39	5,028	5	....
Chilicothe.................arrived 1846	....	....	....	1,188	....	10,339	14,921	....
Do.....................arrived 1847	....	526	894	134	27	56,423	6,131	....
Do.....................cleared 1846	1,328	....	19,073	26,078	25,680	35,407	108,615	....
Do.....................cleared 1847	1,606	23,861	19,146	42,631	49,871	34,403	196,781	3,094
Circleville.................arrived 1846	....	....	....	1,266	1,126	6,002	201	10
Do.....................arrived 1847	4,403	162	38	730	10	6,008	1,146	76
Do.....................cleared 1846	....	485	8,418	28,773	17,467	24,918	106,465	....
Do.....................cleared 1847	....	7,997	14,488	57,998	27,707	43,379	129,660	13,002
Columbus.................arrived 1846	2,775	....	40	1,866	927	....	44	....
Do.....................arrived 1847	....	....	....	579	595	....	....	....
Do.....................cleared 1846	3,351	....	14,192	82,439	942	7,503	77,264	....
Do.....................cleared 1847	11,127	1,438	15,430	151,520	2,809	28,458	134,462	....
Carroll.................arrived 1846	2,945	....	....	....	51	1,103	....	....
Do.....................arrived 1847	720	....	528	56	184	2,500	7,127	....
Do.....................cleared 1846	731	744	9,551	34,320	9,763	84,950	141,931	....
Do.....................cleared 1847	11,118	10,293	7,401	36,194	34,483	163,540	361,497	2,385
Newark.................arrived 1846	....	....	38	....	110	....	22,517	....
Do.....................arrived 1847	....	....	143	914	30	....	8,353	....

Do..........cleared	1846	33,489	9,175	11,336	212,793	8,378	261,079	88,924	......
Do..........cleared	1847	15,926	27,175	10,023	213,272	32,157	278,758	401,042	436,412
Dresden..........arrived	1846	......	......	816	6,630	1,649	25,263	45,278	50
Do..........arrived	1847	......	......	549	4,276	3,128	93,830	20,440	......
Do..........cleared	1846	39,826	837	6,287	51,949	67,356	7,571	13,674	......
Do..........cleared	1847	16,441	......	1,827	11,308	132,978	1,125	17,697	247
Roscoe..........arrived	1846	......	......	......	......	......	29,187	5,909	......
Do..........arrived	1847	......	......	......	375	8	3,051	......	......
Do..........cleared	1846	3,092	7,600	1,022	12,106	29,552	106,082	14,275	......
Do..........cleared	1847	......	14,391	450	16,259	68,607	95,976	68,201	10,427
Dover..........arrived	1846	339	......	......	1,790	......	20,124	5,042	180
Do..........arrived	1847	4,836	......	......	......	......	......	......	......
Do..........cleared	1846	10,026	8,842	671	106,809	57,848	384,453	64,813	......
Do..........cleared	1847	3,413	6,878	124	71,077	72,448	431,390	90,604	......
Massillon..........arrived	1846	......	347	120	2,489	1,709	109,464	1,097	......
Do..........arrived	1847	......	3,702	......	6,344	586	16,394	2,065	......
Do..........cleared	1846	71,085	12,856	1,594	193,657	28,381	875,335	1,705	......
Do..........cleared	1847	73,889	37,388	140	202,719	55,669	1,489,697	45,139	......
Akron..........arrived	1846	......	......	321	22,006	1,028	265,485	25,191	......
Do..........arrived	1847	......	......	......	29,962	943	433,855	16,887	......
Do..........cleared	1846	5,384	27,044	2,583	356,932	144,962	133,749	4,079	543
Do..........cleared	1847	18,154	104,342	1,052	722,743	231,221	589,376	87,134	......
MUSKINGUM IMPROVEMENT.									
Harmer..........arrived	1846	56,211	7,314	6,911	82,893	52,950	674	12,413	395
Do..........arrived	1847	55,996	21,973	6,637	233,911	130,707	324	89,144	901
Do..........cleared	1846	8,109	......	......	......	......	2,243	......	......
Do..........cleared	1847	......	......	......	......	801	180	......	......
McConnellsville..........arrived	1846	......	......	......	570	......	21,416	238	......
Do..........arrived	1847	3,126	......	......	823	......	29,053	100	......
Do..........cleared	1846	23,933	1,510	763	11,076	29,705	......	1,273	......
Do..........cleared	1847	2,990	5,461	572	23,791	49,772	......	13,024	......
Zanesville..........arrived	1846	7,568	200	631	10,986	17,438	30,489	522	......
Do..........arrived	1847	1,846	......	430	12,362	30,458	22,023	10,743	......

Comparative statement—Continued.

Canals and ports.	AGRICULTURE.—ANIMAL PRODUCTS.				AGRICULTURE.			
	Leather, unfinished. pounds.	Eggs, pounds.	Feathers, pounds.	Wool, pounds.	Flour, barrels.	Wheat, bushels.	Corn, bushels.	Meal, bushels.
Zanesville..................cleared 1846	54,632	4,279	11,437	119,480	70,646	10	5,310	24
Do....................cleared 1847	43,749	7,008	8,755	176,784	160,696	....	40,950	....
Dresden....................arrived 1846	32,466	357	6,304	52,751	46,103	1,814	20,463	....
Do....................arrived 1847	23,548	....	1,827	5,503	97,564	2,049	15,168	....
Do....................cleared 1846	....	....	843	8,372	4,700	17,917	....	....
Do....................cleared 1847	....	....	51	12,622	16,177	3,946	....	....
MIAMI CANAL.								
Cincinnati..................arrived 1846	126,677	194,654	....	55,455	209,166	105,604	547,903	33,028
Do....................arrived 1847	96,854	59,287	2,083	33,063	117,671	14,896	112,195	14,827
Do....................cleared 1846	173,585	96,960	10,207	47,683	673	50,214	9,643	4,557
Do....................cleared 1847	88,440	....	38,169	2,989	....	4	37	100
Hamilton....................arrived 1846	....	....	....	....	....	....	....	....
Do....................arrived 1847	....	....	....	....	....	....	....	....
Do....................cleared 1846	....	....	....	....	20,317	25	27,650	....
Do....................cleared 1847	....	....	....	11,797	64,849	17,779	128,142	....
Middletown..................arrived 1846	....	....	....	1,697	10	....	62,902	....
Do....................arrived 1847	....	....	....	....	38	....	1,129	....
Do....................cleared 1846	....	14,281	....	12,449	33,359	4,196	....	11,881
Do....................cleared 1847	....	21,672	....	16,075	46,340	14,000	327,002	....
Dayton....................arrived 1846	....	....	....	19,903	....	....	2,600	2,600
Do....................arrived 1847	....	....	....	....	....	....	815	....
Do....................cleared 1846	....	....	2,265	1,701	59,032	5,815	7,794	5,963
Do....................cleared 1847	10,748	119,809	2,148	41,812	98,079	36,400	140,314	1,806

MIAMI EXTENSION.									
Dayton	arrived 1846							132	
Do	arrived 1847		1,242	245	2,615	163	1,559	2,231	5
Do	cleared 1846			1,469	22,745	15,463	19	20,238	
Do	cleared 1847		600		11,415	857	500	73,344	382
Piqua	arrived 1846	12,635	504	100	66	342	2,641	3,057	
Do	arrived 1847		800	1,267	877	229			
Do	cleared 1846	28,428	18,458	2,007	17,222	19,849	18,660	32,348	145
Do	cleared 1847		73,822	604	9,574	22,126	48,289	100,937	7,478
Junction	arrived 1847	6,411				43			
Do	cleared 1847	500	2,906	209					
WABASH AND ERIE.									
Junction	arrived 1846	85,995				2			
Do	arrived 1847	95,118	200			1			
Do	cleared 1846	54,192	6,096	16,427	46,150	93,478	586,596	1,018,493	21
Do	cleared 1847	58,021	11,232	19,924	90,133	103,277	931,800	1,098,592	6
Maumee City	arrived 1846					6,444	12,811	3,143	
Do	arrived 1847			1,063	3,200	1,304	66,589	12,832	
Do	cleared 1846					4,150	36,173	29,922	
Do	cleared 1847		950		1,046	4,670	85,691	18,776	
HOCKING CANAL.									
Carroll	arrived 1846	3,314	679	8,168	31,592	7,193	39,009	24,406	
Do	arrived 1847	6,704	5,580	5,596	28,117	24,785	99,609	82,680	
Do	cleared 1846	1,899	679	7,068	26,245	7,082	42,152	25,678	
Do	cleared 1847	6,709	5,280	5,596	28,117	22,913	110,807	77,966	
Nelsonville	arrived 1846			199		142		200	
Do	arrived 1847					130		902	
Do	cleared 1846				5,283	342	1,565	1,788	
Do	cleared 1847					2,789	2,410	4,022	
WALHONDING CANAL.									
Roscoe	arrived 1846			188	2,350	2,682	88,384	3,069	
Do	arrived 1847		4,694		3,125	19,547	115,065	27,249	4,692
Do	cleared 1846					3		449	
Do	cleared 1847					2			

Comparative statement—Continued.

Canals and ports.	AGRICULTURE.							
	Oats, bushels.	Barley, bushels.	Seeds, clover, bushels.	Seeds, other grass, bushels.	Seeds, flax, bushels.	Oil, linseed, barrels.	Oil cake, pounds.	Starch, Ohio, pounds.
OHIO CANAL.								
Portsmouth..........arrived 1846	1,308	5,056	387	24	3,069	....	....	....
Do..........arrived 1847	41,723	150	3,585	69	4,645	....	....	88,151
Do..........cleared 1846	....	4,517	41	27	9	135	....	1,526
Do..........cleared 1847	....	4,820	50	90	....	185	1,500	3,579
Chilicothe..........arrived 1846	....	2,484	58	1,282	....	77	....	6,580
Do..........arrived 1847	....	1,641	71	1,063	....	65	1,400	1,373
Do..........cleared 1846	300	306	115	....	719	2	....	....
Do..........cleared 1847	2,012	725	309	65	815	10	....	....
Circleville..........arrived 1846	....	....	....	3	....	25	....	286
Do..........arrived 1847	....	86	72	12	....	24	....	81
Do..........cleared 1846	9,189	6	49	17	794	....	....	....
Do..........cleared 1847	8,533	86	1,561	1,820	444	1	....	85,108
Columbus..........arrived 1846	....	1,009	....	....	....	79	....	503
Do..........arrived 1847	....	....	....	....	....	34	....	....
Do..........cleared 1846	441	....	12	144	194	....	....	1,376
Do..........cleared 1847	10,300	....	1,199	314	741	....	....	827
Carroll..........arrived 1846	6	....	....	....	....	4		....
Do..........arrived 1847	1,914	....	....	....	....	54	....	2,316
Do..........cleared 1846	12,301	474	283	23	1,058	....	....	270
Do..........cleared 1847	20,927	30	492	51	2,316	20	....	151,014
Newark..........arrived 1846	....	643	....	....	....	39	....	....
Do..........arrived 1847	....	310	....	....	....	75	....	407

Do....cleared 1846	25,331	234	165	89	1,270	1		
Do....cleared 1847	18,144	345	171	52	1,642	2		
Dresden....arrived 1846	29	700	22		51	4		
Do....arrived 1847	9,317	1,250			6			
Do....cleared 1846	660	338	38		278	23		
Do....cleared 1847		107			345			
Roscoe....arrived 1846		370			285	5		
Do....arrived 1847		374			119	28		
Do....cleared 1846	2,913	384	31		837	141		105
Do....cleared 1847	3,042				52	17		
Dover....arrived 1846		1,502	30		2,611	1		
Do....arrived 1847	500	1,563			2,297			
Do....cleared 1846	8,136	424	29		2,297	203	121,178	
Do....cleared 1847	9,072		81	6	1,992	162	179,025	
Massillon....arrived 1846	3,914	218	864		148	14		412
Do....arrived 1847						53		1,995
Do....cleared 1846	2,737	4,363	1,179	23	2,181			
Do....cleared 1847	4,760	6,510	3,191	421	2,256	6		
Akron....arrived 1846	7,567	4,694	90		1,334	90		
Do....arrived 1847		1,825	901		6,018	3		
Do....cleared 1846	1,809	188	2,081		2,285	1,174	391,627	33,780
Do....cleared 1847	36,748		3,203		8,180	1,314	1,176,623	39,343
MUSKINGUM IMPROVEMENT.								
Harmer....arrived 1846	52,818		593	64	246		1,700	
Do....arrived 1847	64,665	29,885	256	323	446	31	37,650	
Do....cleared 1846						7		400
Do....cleared 1847				15		8		
McConnellsville....arrived 1846						9		
Do....arrived 1847	436					23		
Do....cleared 1846	9,850		14		774			
Do....cleared 1847	19,493		163	15	363			
Zanesville....arrived 1846	859	80	22	16	1,176	1		
Do....arrived 1847	9,164	400			502	2		

Comparative statement—Continued.

Canals and ports.	AGRICULTURE.							
	Oats, bushels.	Barley, bushels.	Seeds, clover, bushels.	Seeds, other grass, bushels,	Seeds, flax, bushels.	Oil, linseed, barrels.	Oil cake, pounds.	Starch, Ohio, pounds.
Zanesville.................cleared 1846	6,845	44	361		18	111	80,033	
Do.....................cleared 1847	20,091	102	234	30	337	32		
Dresden..................arrived 1846	1,269	44	40			24		
Do.....................arrived 1847		202			265			
Do.....................cleared 1846		100		20	51			
Do.....................cleared 1847					26			
MIAMI CANAL.								
Cincinnati...............arrived 1846	111,398	25,030		11,771	53,779	1,983	1,953,877	
Do.....................arrived 1847	27,977	11,659		2,778	43,646	1,406	1,143,994	
Do.....................cleared 1846						1,363		11,965
Do.....................cleared 1847		583		723		197		2,543
Hamilton.................arrived 1846		182						
Do.....................arrived 1847								
Do.....................cleared 1846			23		20			
Do.....................cleared 1847	5,150	3,000	41		6,587			
Middletown...............arrived 1846		2,707				6		225
Do.....................arrived 1847		20				15		576
Do.....................cleared 1846	4,048				4,201	12		
Do.....................cleared 1847	31,794	13,631	193		8,706	146		
Dayton...................arrived 1846		3,781						
Do.....................arrived 1847		337			170			
Do.....................cleared 1846	1,734	24,089	2,547		29,280		1,508,948	
Do.....................cleared 1847	39,009	4,990	4,643		31,345	2,889	1,957,610	

MIAMI EXTENSION.									
Dayton	arrived 1846	...	...	...	...	125	...	...	...
Do	arrived 1847	...	...	18	...	709	...	...	...
Do	cleared 1846	225	...	...	...	1,245	829	...	...
Do	cleared 1847	750	...	...	...	6,525	638	222,392	...
Piqua	arrived 1846	347	232	...	12	360	16	...	...
Do	arrived 1847	...	...	...	...	...	21	...	...
Do	cleared 1846	23,587	43	886	135	15,681	59	...	...
Do	cleared 1847	...	7,114	642	447	22,451	115	70,655	...
Junction	arrived 1847	65	...	...	...	...	83	...	...
Do	cleared 1847	100	998	41	128	53	...	...	...
WABASH AND ERIE.									
unction	arrived 1846	...	1,007	...	...	...	44	...	...
Do	arrived 1847	...	2,029	...	...	...	18	...	...
Do	cleared 1846	113,383	...	1,082	230	1,965	6	49,470	...
Do	cleared 1847	19,692	...	2,377	270	11,130	20	48,193	...
Maumee City	arrived 1846	1,577	...	...	...	2,285	3	...	...
Do	arrived 1847	20	...	346	75	1,828	...	...	...
Do	cleared 1846	1,946	305	...	143	...	15	...	...
Do	cleared 1847	720	...	50	76	...	12	...	...
HOCKING CANAL.									
Carroll	arrived 1846	9,324	38	102	...	679	4	...	1,593
Do	arrived 1847	12,376	...	542	24	2,110	46	...	2,312
Do	cleared 1846	8,780	53	102	...	831	4	...	...
Do	cleared 1847	12,488	...	547	24	2,120	47	...	2,392
Nelsonville	arrived 1846	36	...	...	...	...	4	...	...
Do	arrived 1847	240	...	...	...	...	2	...	...
Do	cleared 1846	...	50	...	...	42	...	...	...
Do	cleared 1847	...	...	...	...	25	...	...	...
WALHONDING CANAL.									
Roscoe	arrived 1846	...	...	...	...	141	...	...	...
Do	arrived 1847	...	...	...	...	57	...	...	...
Do	cleared 1846	...	...	...	...	...	...	...	...
Do	cleared 1847	...	...	...	...	...	...	...	...

Comparative statement—Continued.

Canals and ports.	AGRICULTURE.							
	Tobacco, unmanufactured, pounds.	Tobacco, manufactured, pounds.	Broom corn, pounds.	Brooms, number.	Ginseng, pounds.	Fruit, dried, U. States, pounds.	Fruit, undried, U. States, pounds.	Sugar, pounds.
OHIO CANAL.								
Portsmouth........arrived 1846	503,432	11,990	38,070	4,974	93	18,738	55,960	....
Do........arrived 1847	354,124	15,905	1,515	3,627	....	52,565	30,025	....
Do........cleared 1846	55,717	224,730	....	200	....	3,108	18,097	1,488,427
Do........cleared 1847	39,969	332,201	....	548	918	2,060	15,985	1,196,309
Chilicothe........arrived 1846	12,479	86,849	7,105	232	....	907	3,879	539,927
Do........arrived 1847	8,711	117,214	....	124	....	2,089	1,026	531,925
Do........cleared 1846	1,892	14,607	7,105	32	23	1,654	41,538	53,930
Do........cleared 1847	11,355	9,421	....	7	....	1,038	220	60,815
Circleville........arrived 1846	800	36,148	....	120	....	2,288	1,491	278,088
Do........arrived 1847	3,133	49,298	110	540	....	672	260	225,594
Do........cleared 1846	4,400	6,932	426,374	864	....	2,736	7,761	4,856
Do........cleared 1847	....	2,034	208,875	2,741	....	6,999	360	17,475
Columbus........arrived 1846	....	12,608	....	....	....	2,316	8,232	30,207
Do........arrived 1847	3,000	64,171	....	....	....	....	....	96,689
Do........cleared 1846	....	....	139,671	2,013	2,141	3,763	6,605	597
Do........cleared 1847	....	6,453	129,959	126	1,794	5,038	....	6,453
Carroll........arrived 1846	4,210	28,201	....	30	....	....	250	191,555
Do........arrived 1847	8,895	60,080	....	77	....	....	....	166,411
Do........cleared 1846	2,247,580	5,977	71,573	929	354	2,146	840	5,331
Do........cleared 1847	665,852	4,039	29,917	3,150	....	21,163	456	6,870
Newark........arrived 1846	3,870	73,559	10,762	490	....	1,454	2,054	215,580
Do........arrived 1847	7,832	100,958	....	48	....	....	....	167,892

Do	cleared	1846	542,118	2,484	10,762	1,605	....	31,728	31,728	9,793
Do	cleared	1847	161,710	12,790	....	60	....	58,423	58,423	3,69[illegible]
Dresden	arrived	1846	1,326,590	12,316	....	1,000	125	....	1,013	20,617
Do	arrived	1847	421,460	7,415	....	....	....	2,747	3,547	24,575
Do	cleared	1846	....	29,839	....	....	558	12,396	500	40,540
Do	cleared	1847	....	22,175	41,966	....	....	12,326	3,000	31,555
Roscoe	arrived	1846	....	14,598	....	....	....	690	1,125	36,823
Do	arrived	1847	....	12,705	....	....	....	....	....	31,972
Do	cleared	1846	228,123	10,774	....	5,082	....	114	559	2,175
Do	cleared	1847	162,983	....	2,613	....	....	10,169	....	....
Dover	arrived	1846	7,218	6,977	....	192	....	....	300	30,889
Do	arrived	1847	5,251	18,843	....	....	....	....	1,049	36,989
Do	cleared	1846	500,441	5,224	....	613	....	17,654	3,405	1,331
Do	cleared	1847	6,066	611	2,700	4,632	....	17,658	2,825	4,677
Massillon	arrived	1846	3,918	74,570	....	966	....	....	4,908	370,456
Do	arrived	1847	5,375	118,809	2,700	126	....	....	150	467,847
Do	cleared	1846	1,819	7,608	....	....	....	14,516	1,293	21,682
Do	cleared	1847	900	9,862	....	....	....	70,405	4,460	12,991
Akron	arrived	1846	54,940	13,463	....	636	....	23,741	42,238	120,723
Do	arrived	1847	3,845	30,582	....	....	....	10,045	4,201	293,743
Do	cleared	1846	46,807	80,662	....	882	....	59,491	34,975	648,028
Do	cleared	1847	159,012	109,045	....	....	....	266,872	162,577	653,209
MUSKINGUM IMPROVEMENT.										
Harmer	arrived	1846	5,922,774	591	105,369	7,459	....	92,208	49,106	....
Do	arrived	1847	2,555,177	2,637	29,400	53,190	....	367,417	17,850	....
Do	cleared	1846	59,061	165,767	29,000	....	....	....	1,300	823,141
Do	cleared	1847	69,821	198,918	....	....	....	....	1,300	886,651
McConnellsville	arrived	1846	14,925	1,514	....	....	....	400	960	43,324
Do	arrived	1847	10,607	15,036	....	....	....	....	....	75,935
Do	cleared	1846	996,161	178	....	2,077	....	18,433	....	....
Do	cleared	1847	811,582	339	14,587	3,241	....	42,527	3,046	....
Zanesville	arrived	1846	1,357,792	125,041	....	2,060	125	....	5,150	662,997
Do	arrived	1847	457,268	208,346	39,904	3,516	....	7,719	3,000	817,295

Comparative statement—Continued.

Canals and ports.	AGRICULTURE.							
	Tobacco, unmanufactured, pounds.	Tobacco, manufactured, pounds.	Broom corn, bushels.	Brooms, number.	Ginseng, pounds.	Fruit, dried, U. States, pounds.	Fruit, undried, U. States, pounds.	Sugar, pounds.
Zancsville.....cleared 1846	2,734,688	14,391	......	3,422	795	36,032	8,125	60,555
Do.....cleared 1847	1,052,531	18,508	41,966	780	1,191	245,135	500	55,682
Dresden.....arrived 1846	......	16,423	......	......	602	12,376	500	65,051
Do.....arrived 1847	......	19,749	41,966	......	675	6,661	......	57,822
Do.....cleared 1846	1,322,676	9,462	......	1,060	......	2,320	......	10,635
Do.....cleared 1847	419,396	5,004	......	......	......	5,979	4,980	21,461
MIAMI CANAL.								
Cincinnati.....arrived 1846	492,404	2,617	......	8,443	......	15,106	470,347	......
Do.....arrived 1847	303,463	11,314	......	1,331	2,228	12,015	654,541	......
Do.....cleared 1846	424,402	418,243	......	......	......	......	......	1,229,138
Do.....cleared 1847	482,316	471,051	......	......	23,433	23,355	......	2,388,055
Hamilton.....arrived 1846	......	......	......	......	......	384	......	......
Do.....arrived 1847	5,225	......	......	......	......	......	......	100,909
Do.....cleared 1846	2,418	......	80,575	1,427	......	......	3,150	......
Do.....cleared 1847	......	......	29,750	......	......	......	17,600	......
Middletown.....arrived 1846	6,995	9,930	......	200	......	......	......	86,456
Do.....arrived 1847	6,234	15,926	......	......	......	......	13,759	128,678
Do.....cleared 1846	249,815	605	......	......	......	......	82,766	5,451
Do.....cleared 1847	422,744	2,645	......	1,259	......	......	30,279	9,037
Dayton.....arrived 1846	......	19,903	......	......	......	......	5,535	......
Do.....arrived 1847	7,201	......	......	......	......	37,441	[Groceries,	&c. 1,411,563
Do.....cleared 1846	......	1,701	......	......	......	......	......	1,822,485
Do.....cleared 1847	40,945	41,812	......	3,852	......	1,782	......	11,326

MIAMI EXTENSION.									
Dayton	arrived 1846								23,112
Do	arrived 1847								47,780
Do	cleared 1846	1,220					7,726		112,484
Do	cleared 1847	1,415		30,000			5,206		89,759
Piqua	arrived 1846	2,828	28,201		4		1,933	18,248	61,090
Do	arrived 1847	13,225	36,195		2,064		2,370	2,250	93,763
Do	cleared 1846	3,856	949		79	1,612	3,508	86,503	1,613
Do	cleared 1847	1,270	1,295		240	1,030	11,900	227,316	632
Junction	arrived 1847	1,934	143,387		96		21,319	73,466	246,589
Do	cleared 1847		1,605			2,210	600		
WABASH AND ERIE.									
Junction	arrived 1846		106,710		1,058		32,848	48,007	112,845
Do	arrived 1847		134,409		1,210		17,861	30,235	261,761
Do	cleared 1846	22,335	18,396		2,582	49,578	3,007		7,921
Do	cleared 1847	34,395	1,674	2,000	2,944	47,417	1,882	11,000	260
Maumee City	arrived 1846		7,706				18,460		14,128
Do	arrived 1847		12,626		24		5,396	21,985	15,207
Do	cleared 1846		1,620		1,557	1,206	3,420		2,113
Do	cleared 1847				168	514		6,194	
HOCKING CANAL.									
Carroll	arrived 1846	2,241,359	26,908			354	4,052	840	182,663
Do	arrived 1847	710,453	45,915				28,465	456	140,291
Do	cleared 1846	1,849,911	27,194		36	234	1,952	840	187,468
Do	cleared 1847	682,619	45,933		12		28,465	456	142,811
Nelsonville	arrived 1846		596		204			5,634	4,681
Do	arrived 1847		5,024		120		330		3,024
Do	cleared 1846	384,500				120			
Do	cleared 1847	27,874					412		
WALHONDING CANAL.									
Roscoe	arrived 1846	125,274							
Do	arrived 1847	84,543							
Do	cleared 1846								4,196
Do	cleared 1847		1,620						2,083

Comparative statement—Continued.

Canals and ports.	AGRICULTURE.		MISCELLANEOUS.					
	Molasses, pounds.	Cotton, raw, in bales, pounds.	Cotton bagging, pounds,	Cotton yarns, pounds.	Hemp, pounds.	Cordage, pounds.	Whiskey, barrels.	Other domestic spirits, barrels.
OHIO CANAL.								
Portsmouth.....arrived 1846	......	......	......	......	......	......	18,185	4
Do.....arrived 1847	5,760	......	......	......	......	770	21,814	25
Do.....cleared 1846	1,241,714	1,327	......	27,922	363,800	25,926	296	......
Do.....cleared 1847	848,758	2,739	......	26,967	122,134	9,109	196	9
Chilicothe.....arrived 1846	522,942	......	496	5,530	4,612	2,395	246	23
Do.....arrived 1847	359,154	......	......	4,887	11,091	1,766	455	21
Do.....cleared 1846	32,030	......	......	......	......	2,020	635	14
Do.....cleared 1847	26,704	......	......	104	1,126	255	543	......
Circleville.....arrived 1846	86,007	......	......	2,776	......	11,242	40	......
Do.....arrived 1847	153,200	......	......	3,940	......	3,824	47	......
Do.....cleared 1846	57,236	......	......	180	......	3,529	5,428	......
Do.....cleared 1847	7,865	......	......	......	......	202	9,292	8
Columbus.....arrived 1846	4,649	1,323	......	3,920	9,126	1,269	40	20
Do.....arrived 1847	21,866	1,719	......	6,123	5,901	2,076	138	......
Do.....cleared 1846	1,105	......	......	......	7,935	560	126	26
Do.....cleared 1847	5,680	......	......	......	......	......	255	......
Carroll.....arrived 1846	125,743	......	......	3,680	......	1,735	117	......
Do.....arrived 1847	214,800	......	......	9,597	1,114	2,363	81	7
Do.....cleared 1846	7,260	......	......	......	......	1,400	3,404	58
Do.....cleared 1847	8,346	......	......	300	......	198	2,978	58
Newark.....arrived 1846	208,627	......	1,010	14,585	......	2,969	174	2
Do.....arrived 1847	103,410	......	......	9,950	......	1,724	18	......

Do....cleared 1846	6,171				1,211		5,804	
Do....cleared 1847	7,109				30,700		8,093	
Dresden....arrived 1846	23,472				8,098	72	1,066	
Do....arrived 1847	2,768					185	446	
Do....cleared 1846	59,841			4,910		2,743	6,170	1
Do....cleared 1847	203,258			11,546		142	6,927	
Roscoe....arrived 1846	60,424						247	
Do....arrived 1847	81,862					412	193	
Do....cleared 1846							1,484	
Do....cleared 1847	4,320						3,306	
Dover....arrived 1846	36,112			3,081		1,305	256	
Do....arrived 1847	42,017			540		2,808	70	2
Do....cleared 1846	2,258						1,403	
Do....cleared 1847	500			140			1,523	21
Massillon....arrived 1846	155,001			1,160		1,393	1,572	
Do....arrived 1847	464,751			740	14,742	1,495	1,493	
Do....cleared 1846	16,025					100	349	
Do....cleared 1847	14,800					469	502	3
Akron....arrived 1846	99,433					218	452	
Do....arrived 1847	80,310					3,651	515	
Do....cleared 1846	429,960				781	6,801	490	
Do....cleared 1847	647,160					25,760	6,871	
MUSKINGUM IMPROVEMENT.								
Harmer....arrived 1846	400					796	885	366
Do....arrived 1847	500					60	980	71
Do....cleared 1846	1,168,661			56,028	31,064	1,031	218	12
Do....cleared 1847	951,521	44,220		122,202	42,166	2,664	322	19
McConnellsville....arrived 1846	127,927			4,762			307	
Do....arrived 1847	105,650			14,859		1,332	423	
Do....cleared 1846							24	
Do....cleared 1847							7	
Zanesville....arrived 1846	890,872			60,304	29,970		1,133	42
Do....arrived 1847	982,820	44,220		84,726	38,121	1,398	1,220	11

Comparative statement—Continued

Canals and ports.	AGRICULTURE.		MISCELLANEOUS.					
	Molasses, pounds.	Cotton, raw, in bales, pounds.	Cotton bagging, pounds.	Cotton yarns, pounds.	Hemp, pounds.	Cordage, pounds.	Whiskey, barrels.	Other domestic spirits, barrels.
Zanesville..........cleared 1846	79,871	....	....	13,205	....	5,397	1,002	2
Do..........cleared 1847	157,735	....	....	18,050	....	3,312	1,256	31
Dresden..........arrived 1846	76,562	....	....	12,823	....	2,968	34	1
Do..........arrived 1847	153,420	....	....	18,050	....	2,718	46	....
Do..........cleared 1846	27,710	....	....	80	5,590	....	1,714	....
Do..........cleared 1847	....	....	....	....	4,714	....	1,178	....
MIAMI CANAL.								
Cincinnati..........arrived 1846	....	....	....	238,316	....	....	40,789	....
Do..........arrived 1847	....	....	....	202,523	....	....	60,434	....
Do..........cleared 1846	1,282,407	939,301	....	....	396,152	....	2,076	....
Do..........cleared 1847	1,331,527	821,706	....	....	327,657	....	630	....
Hamilton..........arrived 1846	....	88,721	....	....	....	....	16	....
Do..........arrived 1847	66,000	103,239	12,640	....	2,000	....	183	....
Do..........cleared 1846	....	....	....	64,650	....	....	3,359	....
Do..........cleared 1847	....	....	....	119,585	....	....	3,015	....
Middletown..........arrived 1846	89,433	55,100	....	7,959	....	....	126	20
Do..........arrived 1847	130,238	55,452	....	300	....	....	112	7
Do..........cleared 1846	....	....	....	34,419	....	....	17,342	....
Do..........cleared 1847	12,600	19,971	....	37,341	....	....	13,619	185
Dayton..........arrived 1846	....	463,531	....	....	....	....	....	....
Do..........arrived 1847	....	362,263	....	....	11,700	....	105	....
Do..........cleared 1846	....	....	....	99,217	....	....	34,976	562
Do..........cleared 1847	....	....	....	55,475	....	....	36,885	....

MIAMI EXTENSION.								
Dayton.....arrived 1846								
Do.....arrived 1847								
Do.....cleared 1846				27,772			225	
Do.....cleared 1847				34,199			1,344	
Piqua.....arrived 1846	69,979			12,057	1,180		489	9
Do.....arrived 1847	91,161			17,388		1,304	435	
Do.....cleared 1846	950			1,005			3,011	8
Do.....cleared 1847	3,670			520			4,008	
Junction.....arrived 1847	248,994			8,904	2,461		132	
Do.....cleared 1847								
WABASH AND ERIE.								
Junction.....arrived 1846	72,834				1,317	2,515		
Do.....arrived 1847	67,467					8,234		
Do.....cleared 1846	2,375				17,934		2,003	
Do.....cleared 1847							3,552	
Maumee City.....arrived 1846	5,663			341			89	
Do.....arrived 1847	4,221						250	
Do.....cleared 1846	4,330				2,808		244	
Do.....cleared 1847							406	
HOCKING CANAL.								
Carroll.....arrived 1846	117,419			3,680		1,704	499	37
Do.....arrived 1847	116,790			9,635	1,114	1,645	468	54
Do.....cleared 1846	117,584			3,680		1,704	536	22
Do.....cleared 1847	116,790			9,635	1,114	1,655	629	54
Nelsonville.....arrived 1846	2,430			76		129	222	12
Do.....arrived 1847	4,903			500		93	320	2
Do.....cleared 1846							28	
Do.....cleared 1847								
WALHONDING CANAL.								
Roscoe.....arrived 1846							484	
Do.....arrived 1847								
Do.....cleared 1846	6,712						1	
Do.....cleared 1847	3,935						6	

Comparative statement—Continued.

Canals and ports.	MISCELLANEOUS.							
	Ale and beer, barrels.	Fish, fresh water, barrels.	Coffee, pounds.	West India fruits.	Paper, pounds.	Powder, pounds.	Merchandise, pounds.	Machinery, pounds.
OHIO CANAL.								
Portsmouth..................arrived 1846	23	86	....	16,241	....	1,800	701,464	63,266
Do..................arrived 1847	21	72	....	3,395	....	2,280	480,022	13,786
Do..................cleared 1846	112	1	347,737	5,002	....	....	2,795,682	39,259
Do..................cleared 1847	100	50	685,569	7,434	....	....	2,754,243	52,570
Chilicothe..................arrived 1846	63	403	359,348	9,845	....	8,950	1,346,167	11,534
Do..................arrived 1847	74	446	444,974	1,325	....	....	1,661,569	9,594
Do..................cleared 1846	65	9	38,082	1,600	....	....	127,540	857
Do..................cleared 1847	12	12	32,242	....	....	....	165,202	5,353
Circleville..................arrived 1846	26	454	169,114	2,015	166	1,120	706,031	7,213
Do..................arrived 1847	8	439	212,759	3,154	....	....	817,685	9,432
Do..................cleared 1846	6	60	13,039	286	108	604	73,589	5,321
Do..................cleared 1847	10	46	5,724	80	....	....	79,815	6,900
Columbus..................arrived 1846	14	802	73,364	....	....	19,195	2,267,1[illegible]3	30,356
Do..................arrived 1847	10	555	239,518	6,039	....	2,925	2,110,7[illegible]9	32,189
Do..................cleared 1846	29	10	157	....	....	....	333,530	7,609
Do..................cleared 1847	....	....	1,766	....	....	....	286,897	88,500
Carroll..................arrived 1846	3	500	154,502	85	611	25	455,609	....
Do..................arrived 1847	½	563	219,238	1,821	195	416	824,324	1,000
Do..................cleared 1846	10	44	3,400	490	208	517	87,313	2,000
Do..................cleared 1847	38	15	5,409	....	....	50	44,740	....
Newark..................arrived 1846	....	444	293,221	3,789	....	480	1,012,754	3,480
Do..................arrived 1847	1	789	219,356	1,617	....	8,590	1,203,768	14,134

Do....cleared 1846	39	115	7,213	261	304	492	135,833	4,628
Do....cleared 1847	44	21	2,033	....	....	....	113,558	566
Dresden....arrived 1846	10	685	214,723	4,869	48	2,070	692,054	2,570
Do....arrived 1847	58	363	182,345	2,278	....	3,960	753,393	42,053
Do....cleared 1846	....	19	55,996	....	4,370	....	511,233	35,032
Do....cleared 1847	5	....	28,140	....	....	....	....	470,049
Roscoe....arrived 1846	57	315	81,035	....	4,705	240	370,309	1,800
Do....arrived 1847	92	135	97,891	....	367	....	500,897	2,153
Do....cleared 1846	5	116	1,522	....	....	....	72,699	688
Do....cleared 1847	8	32	2,276	....	....	....	25,283	3,600
Dover....arrived 1846	61	496	92,966	681	481	1,528	768,660	18,216
Do....arrived 1847	15	553	160,447	300	....	150	769,513	520
Do....cleared 1846	21	60	9,590	....	....	2,305	70,863	5,021
Do....cleared 1847	60	90	762	....	249	....	63,085	16,863
Massillon....arrived 1846	147	2,004	357,925	6,433	1,028	2,333	2,303,487	80,591
Do....arrived 1847	70	2,803	408,708	3,908	1,300	2,280	2,563,263	58,523
Do....cleared 1846	14	79	20,001	....	325	1,068	427,130	7,300
Do....cleared 1847	18	117	12,678	....	....	300	231,006	35,406
Akron....arrived 1846	230	2,581	182,961	433	....	....	2,493,821	63,879
Do....arrived 1847	457	3,017	272,620	1,916	....	....	2,973,017	58,694
Do....cleared 1846	24	92	67,209	....	40,490	29,505	3,605,003	148,180
Do....cleared 1847	....	....	96,001	....	75,239	24,993	3,282,714	341,720
MUSKINGUM IMPROVEMENT.								
Harmer....arrived 1846	18	79	....	....	60,331	400	97,232	3,858
Do....arrived 1847	....	15	....	....	47,649	....	50,466	2,890
Do....cleared 1846	24	232	580,689	3,317	1,875	....	1,746,391	34,399
Do....cleared 1847	17	1,150	766,684	8,810	....	....	2,110,563	47,799
McConnellsville....arrived 1846	50	59	41,859	....	3,732	....	355,683	3,800
Do....arrived 1847	81	14	97,177	....	4,650	....	463,470	6,500
Do....cleared 1846	....	....	....	....	307	....	9,548	100
Do....cleared 1847	....	....	....	....	....	....	4,464	1,325
Zanesville....arrived 1846	20	866	694,676	5,939	1,774	1,560	2,117,527	34,771
Do....arrived 1847	9	291	766,073	9,753	....	3,960	3,201,285	68,178

Comparative statement—Continued.

Canals and ports.	MISCELLANEOUS.							
	Ale and beer, barrels.	Fish, fresh water, barrels.	Coffee, pounds.	West India fruits.	Paper, pounds.	Powder, pounds.	Merchandise, pounds.	Machinery, pounds.
Zanesville..........cleared 1846	88	45	67,243	....	59,125	....	825,827	39,543
Do..........cleared 1847	114	15	37,585	....	47,964	....	894,255	9,329
Dresden..........arrived 1846	29	21	72,535	....	4,270	....	683,321	37,412
Do..........arrived 1847	157	....	44,484	....	937	....	719,694	22,111
Do..........cleared 1846	....	628	169,615	3,206	....	1,590	624,701	2,570
Do..........cleared 1847	....	303	130,733	130	....	2,960	826,958	16,242
MIAMI CANAL.								
Cincinnati..........arrived 1846	3,262	1,216	....	....	181,885	....	5,418,176	169,382
Do..........arrived 1847	2,846	2,270	....	....	138,829	....	4,894,545	73,255
Do..........cleared 1846	....	52	658,335	37,080	....	....	4,732,691	304,556
Do..........cleared 1847	9	89	887,661	17,863	....	....	9,438,548	81,552
Hamilton..........arrived 1846	....	96	....	....	....	....	324,483	35,483
Do..........arrived 1847	....	....	....	....	....	....	460,786	....
Do..........cleared 1846	173	....	....	....	....	....	37,549	2,500
Do..........cleared 1847	48	....	....	....	....	....	....	4,070
Middletown..........arrived 1846	....	....	63,609	426	1,862	98	248,326	500
Do..........arrived 1847	7	....	72,232	1,090	....	....	652,113	34,207
Do..........cleared 1846	661	....	....	....	4,548	....	34,626	22,730
Do..........cleared 1847	532	....	3,160	....	2,475	....	36,565	24,048
Dayton..........arrived 1846	....	46	....	....	....	....	1,005,182	65,660
Do..........arrived 1847	....	60	....	....	....	....	1,929,104	44,955
Do..........cleared 1846	1,699	....	....	....	96,987	....	....	20,492
Do..........cleared 1847	2,275	48	....	....	145,990	....	22,736	31,440

MIAMI EXTENSION.									
Dayton	arrived 1846		586					75,405	
Do	arrived 1847	2	911					291,411	14,706
Do	cleared 1846	23	240			2,404	570	101,127	23,972
Do	cleared 1847	34	17			6,535		250,115	22,834
Piqua	arrived 1846	30	852	96,845	715			631,838	26,621
Do	arrived 1847	31	1,146	157,883	1,875	620		790,714	4,710
Do	cleared 1846	3	104	985				114,756	22,150
Do	cleared 1847			1,447				54,391	9,702
Junction	arrived 1847	35		294,986	25,197	6,165	1,450	857,619	28,950
Do	cleared 1847		1			21,699		24,123	
WABASH AND ERIE.									
Junction	arrived 1846	143	1,522	785,189	3,600	600	2,910	4,117,276	49,731
Do	arrived 1847	222	1,200	1,044,016	6,117		430	5,032,963	113,541
Do	cleared 1846			650				65,428	3,490
Do	cleared 1847	11	8				928	67,881	1,804
Maumee City	arrived 1846	46	74	18,794				385,967	809
Do	arrived 1847	149	52	49,875				487,276	3,500
Do	cleared 1846		1,367	8,155				68,686	
Do	cleared 1847	24	1,206	670				54,759	1,200
HOCKING CANAL.									
Carroll	arrived 1846	3	322	137,914	878	415	25	402,793	
Do	arrived 1847	37	287	195,734	2,340		285	662,693	785
Do	cleared 1846	4	341	141,409	878	831	85	411,763	379
Do	cleared 1847	37	314	202,694	2,340	209	530	687,803	785
Nelsonville	arrived 1846	9	11	3,231		271		34,509	10,126
Do	arrived 1847	44	34	7,856		372	648	42,582	1,000
Do	cleared 1846							1,562	
Do	cleared 1847							3,309	
WALHONDING CANAL.									
Roscoe	arrived 1846						15,866	5,027	
Do	arrived 1847							1,641	
Do	cleared 1846		20	3,264				23,128	
Do	cleared 1847	1	58	20,318				124,025	

Comparative statement—Continued.

Canals and ports.	MISCELLANEOUS.					
	Sundries, pounds.	Passengers, number.	Miles traveled, number.	Baggage, (extra) furniture, pounds.	Clocks, pounds.	Crockery, foreign, pounds.
OHIO CANAL.						
Portsmouth .... arrived 1846	751,182	4,799	440,432	389,219	22,922	3,993
Do .... arrived 1847	1,788,479	3,406	289,691	207,348	22,728	1,580
Do .... cleared 1846	642,746	....	....	219,673	20,031	159,126
Do .... cleared 1847	718,168	....	....	169,178	2,385	139,285
Chilicothe .... arrived 1846	351,690	1,631	120,838	109,458	29,092	167,745
Do .... arrived 1847	977,638	1,908	149,382	97,393	4,263	83,072
Do .... cleared 1846	300,504	....	....	130,913	192	8,060
Do .... cleared 1847	821,439	....	....	85,049	2,687	15,431
Circleville .... arrived 1846	605,207	753	55,136	69,815	13,573	22,611
Do .... arrived 1847	680,594	1,109	92,448	56,480	2,788	34,541
Do .... cleared 1846	221,588	....	....	81,392	30	3,444
Do .... cleared 1847	154,356	....	....	78,871	128	....
Columbus .... arrived 1846	....	1,632	117,904	147,402	44,355	65,432
Do .... arrived 1847	443,536	1,250	91,553	113,594	30,935	71,967
Do .... cleared 1846	1,212,036	....	....	96,274	100	....
Do .... cleared 1847	1,288,909	....	....	87,279	11,744	....
Carroll .... arrived 1846	200,172	645	28,937	51,770	2,260	28,226
Do .... arrived 1847	491,088	1,644	79,968	82,272	11,789	24,670
Do .... cleared 1846	265,717	645	....	83,244	840	1,600
Do .... cleared 1847	1,219,387	21,240	....	63,758	91	2,473
Newark .... arrived 1846	194,715	1,473	84,009	89,393	4,787	41,603
Do .... arrived 1847	154,850	2,166	115,552	116,348	579	58,287

Do	cleared 1846	241,760	....	....	157,237	124	770
Do	cleared 1847	411,801	....	....	119,475	....	730
Dresden	arrived 1846	486,068	883	47,655	69,333	10,720	21,288
Do	arrived 1847	482,769	1,135	58,415	32,925	10,457	53,174
Do	cleared 1846	210,450	....	....	83,840	123	16,622
Do	cleared 1847	509,817	....	....	80,658	142	19,542
Roscoe	arrived 1846	45,630	520	18,257	47,447	310	5,697
Do	arrived 1847	120,576	1,055	33,903	47,133	2,558	27,933
Do	cleared 1846	41,945	....	....	102,265	25	149
Do	cleared 1847	337,709	....	....	61,449	....	2,133
Dover	arrived 1846	17,929	733	35,349	50,563	2,248	14,795
Do	arrived 1847	16,484	1,038	43,811	77,110	8,272	22,196
Do	cleared 1846	8,424	....	....	60,791	....	450
Do	cleared 1847	6,127	....	....	114,393	200	....
Massillon	arrived 1846	740,839	....	....	271,756	883	37,137
Do	arrived 1847	382,215	1,356	48,790	163,517	16,279	121,272
Do	cleared 1846	765,593	842	29,822	178,094	....	225
Do	cleared 1847	67,811	....	....	166,031	100	1,960
Akron	arrived 1846	563,341	2,228	67,693	288,239	8,407	43,527
Do	arrived 1847	1,355,201	3,207	100,331	308,160	7,222	103,140
Do	cleared 1846	915,166	....	....	491,817	5,324	21,053
Do	cleared 1847	3,317,741	....	....	414,086	....	63,560
MUSKINGUM IMPROVEMENT.							
Harmer	arrived 1846	2,711,629	1,872	108,081	277,744	1,632	....
Do	arrived 1847	2,594,564	2,195	116,240	18,088	576	....
Do	cleared 1846	435,972	....	....	52,337	2,688	130,010
Do	cleared 1847	504,851	....	....	6,710	18,441	129,127
McConnellsville	arrived 1846	74,584	124	2,892	24,037	3,873	7,627
Do	arrived 1847	154,723	136	2,963	70,246	....	23,829
Do	cleared 1846	584,413	....	....	47,410	1,280	....
Do	cleared 1847	918,941	....	....	65,720	....	....
Zanesville	arrived 1846	241,850	2,411	89,752	101,033	11,121	125,703
Do	arrived 1847	260,520	2,932	115,072	120,608	28,649	242,531

Comparative statement—Continued.

Canals and ports.	MISCELLANEOUS.					
	Sundries, pounds.	Passengers, number.	Miles travelled, number.	Baggage, (extra) furniture, pounds.	Clocks, pounds.	Crockery, foreign, pounds.
Zanesville..........cleared 1846	434,213	....	....	205,677	5,393	25,428
Do..........cleared 1847	909,788	....	....	149,601	293	24,275
Dresden..........arrived 1846	496,634	1,280	17,980	72,146	123	26,348
Do..........arrived 1847	371,513	986	14,633	77,406	....	21,677
Do..........cleared 1846	237,030	....	....	62,321	10,708	10,752
Do..........cleared 1847	198,252	....	....	32,570	11,192	49,328
MIAMI CANAL.						
Cincinnati..........arrived 1846	1,925,904	16,023	1,237,613	290,741	144,608	48,588
Do..........arrived 1847	876,618	10,496	938,055	248,222	176,760	19,858
Do..........cleared 1846	1,285,800	....	....	14,000	....	200,592
Do..........cleared 1847	732,089	....	....	24,054	....	135,505
Hamilton..........arrived 1846	389,385	63	1,364	....	....	....
Do..........arrived 1847	300,535	....	2,344	10,835	....	....
Do..........cleared 1846	99,210	....	....	....	....	....
Do..........cleared 1847	1,130,392	....	....	62,646	....	....
Middletown..........arrived 1846	32,564	263	430	27,835	....	....
Do..........arrived 1847	72,896	....	....	19,595	....	22,709
Do..........cleared 1846	16,283	....	....	75,905	....	....
Do..........cleared 1847	6,393	....	....	83,305	....	....
Dayton..........arrived 1846	570,631	906	41,781	81,947	....	....
Do..........arrived 1847	539,969	1,718	74,241	55,877	....	....
Do..........cleared 1846	267,585	....	....	267,472	....	....
Do..........cleared 1847	251,552	....	....	101,153	....	....

MIAMI EXTENSION.							
Dayton	arrived 1846	8,188	731	46,293	29,828	....	....
Do	arrived 1847	134,923	897	70,481	1,300	....	....
Do	cleared 1846	70,793	....	....	84,791	....	....
Do	cleared 1847	55,069	....	....	....	....	....
Piqua	arrived 1846	753,847	2,192	117,771	118,583	5,028	30,782
Do	arrived 1847	55,684	1,796	112,472	107,103	7,353	51,323
Do	cleared 1846	1,007,857	....	....	129,937	1,720	....
Do	cleared 1847	33,355	....	....	14,474	....	....
Junction	arrived 1847	257,204	443	52,894	136,613	4,615	50,001
Do	cleared 1847	30,673	....	....	47,474	....	634
WABASH AND ERIE.							
Junction	arrived 1846	1,187	5,762	328,262	518,595	81,040	279,204
Do	arrived 1847	80	5,683	315,537	515,504	109,603	374,270
Do	cleared 1846	650	....	....	123,897	1,000	....
Do	cleared 1847	....	....	....	134,989	....	....
Maumee City	arrived 1846	46,271	69	2,235	84,636	....	....
Do	arrived 1847	81,171	257	9,127	110,576	1,370	11,991
Do	cleared 1846	49,712	....	....	104,706	....	2,180
Do	cleared 1847	78,501	....	....	146,455	....	....
HOCKING CANAL.							
Carroll	arrived 1846	281,949	420	8,697	55,621	4,399	23,023
Do	arrived 1847	989,314	531	6,646	69,278	6,927	20,598
Do	cleared 1846	259,218	....	....	53,375	4,451	23,023
Do	cleared 1847	1,080,776	....	....	79,353	6,927	21,098
Nelsonville	arrived 1846	121,535	119	3,037	22,375	254	....
Do	arrived 1847	40,863	....	....	18,941	2,368	860
Do	cleared 1846	10,404	....	....	4,296	....	....
Do	cleared 1847	4,264	521	8,394	8,390	....	....
WALHONDING CANAL.							
Roscoe	arrived 1846	2,332	21	498	11,078	....	3,291
Do	arrived 1847	35,988	76	1,397	....	....	....
Do	cleared 1846	....	113	1,205	2,240	....	7,099
Do	cleared 1847	5,262	....	....	10,341	141	....

From the Exchange Reporter and Peabody's Com. Atlas.

CINCINNATI BUSINESS STATISTICS.

Annual report of the Chamber of Commerce.

The period embraced is from September 1, 1846, *to Aug.* 31, 1847, *inclusive.*

Imports.

Breadstuffs, value,	$3,213,433
Provisions,	1,801,185
Dairy products,	224,027
Fruits, domestic,	113,438
Do. foreign,	51,774
Naval stores,	19,137
Sundry produce, (seeds, potatoes, &c.)	287,227
Liquors, distilled and fermented,	1,915,041
Hides and leather,	369,209
Metals,	1,578,893
Sundries (tobacco, hemp, salt, cotton, &c. and manufactures,)	1,852,092
Groceries,	2,934,300
Merchandise, (dry goods, wares, drugs, &c.)	34,335,400
Lumber, &c.	1,296,677
Total	$49,991,833

Heavy teams also are constantly arriving with flour, whiskey, (and in their season) pork, bacon and lard, and the various agricultural products, besides, perhaps, on an average four hundred farmers' wagons, mostly two-horse, arriving daily, which, in addition to supplying the immediate wants of the city, furnish large quantities of apples, butter, brooms, corn, eggs, feathers, dried fruits, (apples and peaches) oats, onions, potatoes and other vegetables, seed, &c. which enter into the exports.

Exports.

Breadstuffs, value,	$3,268,086
Provisions,	4,632,033
Live stock,	175,202
Dairy products,	434,102
Sundry produce,	367,384
Liquors, (distilled and fermented,)	1,637,878
Metals,	543,027
Sundries, (hides, tobacco, salt, wool, &c.)	44,085,897
Groceries,	686,916
Lumber, coal and coke,	79,926
Total	$55,910,454

The amount and character of the tonnage employed in the commerce of the city, will appear from the following:

Number of steamboats arrived in the last year,	3,729
Do. of flatboats, do. do.	3,330

The arrivals of steamboats during the last two years, compare thus: From September 1, to August 31, inclusive:

In 1845 and 1846........ 3,619 1846 and 1847........ 3,729

Increase in 1847—steamboats,........................ 110

The number of flatboats which have departed from the city, laden with provisions and produce, is about........................ 700

PENNSYLVANIA CANAL.

The following tables show the comparative quantity of the leading articles which arrived at and cleared from Pittsburg by the Pennsylvania canal, during the fiscal years 1846 and 1847, commencing December 1st and ending November 30th. We have prepared the tables from statements made in the Pittsburg Gazette.

Imports.	1847.	1846.
Ale, &c., barrels,	18,478	14
Anvils, pounds,	297,773	418,498
Ashes,	230,300	......
Chinaware,	5,046,218	4,857,454
Coffee,	9,927,605	10,920,993
Clay, German,	853,920	1,100,291
Drugs,	789,207	514,941
Dry goods,	23,201,074	12,651,818
Fish,	5,977,894	bbls. 19,600
Groceries,	7,833,925	6,933,856
Hats and shoes,	2,690,881	2,049,540
Hardware,	14,501,693	10,522,463
Iron, pig,	21,979,353	15,410,966
Castings,	124,662	
Blooms,	14,942,390	13,890,707
Bar and sheet,	4,397,268	2,833,879
Nails, &c.	15,886,711	575,402
Leather,	312,239	386,225
Oats, bushels,	21,360	19,080
Paints, pounds,	382,293	107,352
Salt, bushels,	137,240	165,415
Spanish whiting, pounds,	522,901	559,532
Steel,	169,501	197,171
Tobacco, leaf,	1,613,876	784,172
Tin,	1,087,880	1,029,814
Exports.		
Bacon, pounds,	12,713,427	21,661,236
Beef and pork,	41,225	19,660
Buffalo robes,	478,862	......
Butter,	747,645	800,265
Cotton,	1,056,138	1,000,971
Dry goods,	410,735	228,692
Earthenware,	69,484	50,952
Flour, barrels,	297,940	156,402
Glassware, pounds,	229,227	270,797
Groceries,	1,978,822	1,779,889
Hardware,	246,887	239,353
Hemp,	3,311,618	1,287,886
Iron, pig,	65,537	2,675,341
Castings,	250,910	
Blooms,	13,836	333,702
Nails,	50,760	82,735
Steel,	549,416	319,732
Lead,	188,078	325,985
Lard and lard oil,	5,319,378	2,929,286
Tallow,	62,916	291,313

CHESAPEAKE AND DELAWARE CANAL

During the year ending December 1st, the following articles passed through this canal:

Passed by the canal eastward from Chesapeake city.

Flour, barrels,	143,259	Hides, pounds,	259,594
Wheat, bushels,	886,756	Tobacco leaf,	953,139
Rye,	75,097	Manufactured,	2,605,684
Corn,	533,762	Coffee,	1,571,780
Iron, pig, pounds,	79,593,359	Groceries,	1,097,000
Blooms and castings,	8,537,880	Sugar,	938,552
Wrought,	18,058,491	Dry goods,	3,498,522
Nails, kegs,	1,634,877	Cotton,	682,723
Lumber, square feet,	44,395,047	Wool,	700,044
Leather,	1,617,050		

Departed westward from Delaware city.

Coffee, pounds,	2,272,426	Molasses, hhds, 1,169 bls.	9,861
Groceries,	10,394,967	Hides, pounds,	2,350,428
Dry goods,	20,694,381	Flour, barrels,	3,279
Fish, barrels,	16,419	Wheat, bushels,	46,746
Sugar, pounds,	4,393,718		

DISMAL SWAMP CANAL.

The following articles passed from North Carolina through the Dismal Swamp canal during the year commencing October 1, 1846, *and ending September* 30, 1847:

Cotton, bales,	3,723	Timber, for masts, c. feet,	150
Fish, barrels,	47,415	Do. other kinds, do.	49,182
Naval stores,	35,506	Plank and scantling, feet,	145,972
Spirits,	239	Staves, pipe,	92,470
Bacon, 100 pounds,	4,496	Do. hogsheads,	5,219,980
Lard, kegs,	1,328	Do. barrels,	284,620
Corn, bushels,	1,226,908	Do. coopers',	301,340
Wheat,	41,639	Shingles, long,	1,116,540
Peas,	31,963	Do. 2 feet,	1,052,800
Flaxseed,	3,004	Do. building,	22,455,840
Potatoes,	11,597	Fence rails,	13,406
Wood, cords,	4,943	Garden pales,	19,890

The following articles passed through the above canal into North Carolina during the time aforesaid:

Wine, quarter casks,	59	Dry goods, boxes,	1,358
Spirits, barrels,	2,988	Hats and shoes,	1,002
Pork,	744	Soap and candles,	1,072
Flour,	5,371	Nails, kegs,	973
Fish,	143	Powder,	158
Bread,	280	Tobacco,	388
Beer and cider,	114	Ware, crates,	136
Sugar,	504	Cheese casks,	197
Do. hogsheads,	112	Lime,	3,797
Molasses,	746	Salt, bushels,	122,378
Spirits,	275	Iron, tons,	84
Coffee, bags.	1,295		

IMPORTS INTO NEW ORLEANS

From the interior, commencing September 1, 1847, *and same time* 1846.

Articles.	This year.	Last year.
Bacon, assorted, hogsheads and casks,	9,916	10,945
Bacon, do. barrels and boxes,	7,569	4,086
Bacon, hams, hogsheads and tierces,	6,385	5,423
Bacon, in bulk, pounds,	142,540	248,413
Bagging, pieces,	50,788	24,388
Bale rope, coils,	38,016	14,387
Beans, barrels,	15,201	16,248
Butter, kegs and firkins	25,870	30,581
Butter, barrels,	1,004	574
Beeswax,	490	579
Beeswax, pounds,	3,550	1,600
Beef, barrels,	28,865	15,576
Beef, hogsheads and tierces,	11,640	12,587
Beef, dried, pounds,	50,600	38,000
Buffalo robes, packs,	6	14
Cotton, Louisiana and Mississippi, bales,	62,234	367,956
Lake,	9,023	2,542
N. Alabama and Tennessee,	97,546	128,408
Arkansas,	39,387	27,882
Mobile,	4,925	6,757
Florida,	1,601	7,591
Texas,	3,964	671
Corn meal, barrels,	24,743	6,046
Corn, in ear,	292,916	255,226
Corn, shelled, sacks,	556,312	929,833
Cheese, boxes,	35,437	35,444
Coal, western, barrels,	181,500	209,960
Dried apples,	1,010	4,892
Dried peaches,	278	2,791
Feathers, bags,	1,705	2,966
Flaxseed, tierces,	2,645	539
Flour, barrels,	379,426	824,366
Furs, boxes and hogsheads,	62	32
Furs, bundles,	104	104
Gin barrels,	40	
Hemp, bundles,	9,601	15,986
Hides, number,	25,241	40,727
Horns,	11,000	600
Hay bundles,	34,988	50,927
Iron, pig, tons,	352	911
Lard, hogsheads,	459	111
Lard, tierces and barrels,	142,366	65,914
Lard, kegs,	224,751	194,559
Lime, western, barrels,	6,403	1,555
Lead, pigs,	217,843	218,600
Lead, bar, kegs and boxes,	524	320
Lead, white, kegs,	6,434	9,903
Molasses, barrels,	122,436	70,016
Oats, barrels and sacks,	237,906	240,122

Tobacco, leaf,	14,777,059	24,696,742
Oil, linseed, barrels,	1,090	1,361
Oil, castor,	746	596
Oil, lard,	2,281	1,611
Potatoes,	108,511	102,364
Pork,	214,843	166,736
Pork, hogsheads,	1,279	6,334
Pork, in bulk, pounds,	5,981,430	3,427,200
Skins, deer, packs,	485	703
Skins, bear,	13	41
Shot, kegs,	4,353	2,462
Soap, boxes,	2,715	1,757
Staves, thousand,	74	482
Sugar, hogsheads,	860,951	61,372
Spanish moss, bales,	2,074	3,032
Tallow, barrels,	3,728	5,022
Tobacco, leaf, hogsheads,	16,267	8,120
Do. chewing, kegs and boxes,	5,104	2,901
Tobacco, bales,	78	722
Wool, bags,	975	524
Whiskey, barrels,	69,131	77,007
Wheat, barrels and sacks,	27,428	84,705

Exports from New Orleans of flour, pork, bacon, lard, beef, lead, whiskey and corn, for two years, from 1st September to 31st August.

PORTS.	1846 and 1847.							
	Flour, barrels.	Pork, barrels.	Bacon, hhds.	Lard, kegs.	Beef. barrels	Lead, pigs.	Whiskey barrels.	Corn, sacks.
New York,	63,877	77,828	3,480	209,945	9,167	339,560	8,210	107,890
Boston,	96,507	76,755	2,379	165,513	9,053	123,917	1,162	139,678
Philadelphia,	13,296	5,247	852	53,377	564	135,489	4,856	15,324
Baltimore,	3,637	17,167	1,159	23,251	556	9,962	7,103	3,253
Charleston,	7,720	1,004	2,874	5,367	150	465	8,180	800
Other coastwise ports	38,381	11,033	11,092	12,813	2,943	1,000	33,005	43,842
Cuba,	43,051	1,092	1,015	144,002	467	149	.....	133,798
Other foreign ports,	1,053,037	40,394	3,053	293,714	29,096	13,716	743	2,076,228
Total	1,319,500	230,520	25,904	907,977	51,996	624,258	63,259	2,520,813

PORTS.	1845 and 1846.							
	Flour, barrels.	Pork, barrels.	Bacon, hhds.	Lard, kegs.	Beef, barrels	Lead, pigs.	Whiskey barrels,	Corn, sacks.
New York,	83,854	88,228	2,873	204,323	5,162	309,681	4,098	172,186
Boston,	122,148	89,164	846	190,504	3,501	139,364	150	289,523
Philadelphia,	250	29,783	1,238	69,153	99	70,113	647	3,671
Baltimore,	....	19,523	729	39,619	446	11,961	2,175	1,000
Charleston,	11,476	2,828	1,962	5,677	275	4,620	8,982	87,953
Other coastwise ports	68,441	13,434	12,720	20,671	4,490	8,460	41,869	175,582
Cuba,	7,094	1,005	610	92,336	391	....	....	....
Other foreign ports,	279,931	28,354	64	168,621	43,798	174,086	260	211,674
Total	573,194	272,319	21,042	790,904	58,162	718,285	58,181	941,589

In the above, the exports to Mobile, &c. via the Pontchartrain Rail Road and New Canal, are included.

LUMBER TRADE OF MACHIAS RIVER.

Amount of lumber surveyed and sold on the Machias river during the year 1847, viz:

Total.—Boards and scantling, feet,	32,214,327
" Laths,	43,039,700
" Sawed shingles,	400,000
" Sawed clapboards,	150,000

THE ASH TRADE.

Ashes received on the Hudson River by Canals.

Year.	Tons of Ashes.	Value.
1842	11,480	$963,716
1843	20,379	1,924,041
1844	20,922	1,689,707
1845	20,744	1,688,859
1846	13,613	1,002,006
1847, to November 30	9,187	1,102,440

The increase of Michigan is exhibited in the following table, which was received at Buffalo:

Year.	Casks.
1843	11,881
1844	11,827
1845	11,158
1846	6,951

The analysis represents American ashes as containing the most alkali—the Russian next—the Polish least.

To what foreign nations then, does our ashes go to?

The annexed table will show the shipments:

Exports 1846—*Pots and Pearls.*

Whither exported.	Tons.	Value.
Prussia,	570	$46,433
Sweeden and Norway,	51	4,421
Denmark,	5	400
Hanse towns,	1,239	99,473
Holland,	2,053	154,771
Belgium,	2,083	177,921
England,	526	40,644
Scotland,	270	21,232
British East Indies,	7	494
British American colonies,	49	4,800
France on Atlantic,	2,163	179,175
Portugal,	15	1,193
Mexico,	2	152
Brazils,	35	3,082
Chili,	5	491
Africa,	2	189
South Seas,	5	388
Total	9,800	$735,689

The manufacture of ashes, west of Buffalo, has increased from 128 tons in 1835, to 800 tons in 1845, while our whole exports, as will be seen above, is only 9,800 tons.

Its Manufacture.

In the western states the ashes are mostly made from new clearings that are rapidly going on. It is no small item to the new settler to save them. Some say, in heavy timbered land, it will pay for the clearing and getting in the first crop. It is estimated that from 75 to 150 bushels of ashes can be collected from an acre, according to the quality of timber. Every 400 bushels carefully saved, will produce a ton of pot or pearl ashes. This gives about 500 pounds to the acre, and that at present prices, is worth $28 in market. The principal expense for their make, are kettles. $100 worth of them would be sufficient for two farmers to do all they wished in the business. The process is very simple, and any one can engage in the business.—*Buffalo Commercial Advertiser.*

ROCHESTER FLOUR TRADE.

The Rochester Democrat of Tuesday, furnishes a review of the flour trade at that place, which we copy in an abridged form.

The following table shows the amount of flour shipped from Rochester for three years past, during the season of canal navigation:

	1845.	1846.	1847.
Total	518,318	540,232	588,080

To ascertain the whole quantity manufactured in the place, it is necessary to add to the above amount the 20,000 barrels forwarded east by rail road during the suspension of navigation—30,000 for home consumption, and a few thousand barrels exported by lake. This will show an aggregate of about 650,000 barrels turned out by the Rochester mills this year, yielding, with the bran, shipstuffs, &c., to the state, a revenue of $200,000.

The supply of wheat is derived from the Erie canal, Genesee Valley canal, Tonawanda rail road, Lake Ontario, and wagons from the country adjacent. The following will show the receipts by canal. The column for 1847 is brought down to December 1st, since when a few thousand bushels were received:

	1845.	1846.	1847.
Total	1,042,426	1,034,096	1,879,110

The receipts by the Erie canal have increased this year, twenty-five per cent., while there is a considerable falling off in those by the Genesee canal.

The receipts of wheat by rail road are estimated at 150,000, and those by the lake at 60,000 bushels.

The mills, to manufacture 650,000 barrels of flour, require 2,825,000 bushels of wheat.

Amount necessary to supply the mills,		2,825,000
Receipts by canal	1,879,110	
By rail road,	150,000	
By lake,	60,000	
		2,089,110
Amount supplied by team,		835,890

Rochester Advertiser.

THE CHEESE TRADE.

The Western Reserve Chronicle says: By a reference to the books at the canal office, we are enabled to state the amount cleared for market during the last six years, viz:

1842,	pounds,	1,230,168	1845,	pounds,	2,995,376
1843,	"	2,415,177	1846,	"	4,763,723
1844,	"	3,944,404	1847,	"	6,599,170

The Albany Journal gives the following statement of the amount of Cheese received at Albany and Troy during the past twelve years:

1836,	pounds,	14,060,000	1842,	pounds,	19,004,000
1837,	"	15,500.000	1843,	"	24,331,000
1838,	"	13,810,000	1844,	"	26,677,500
1839,	"	14,530,000	1845,	"	27,542,861
1840,	"	18,820,000	1846,	"	35,560,180
1841,	"	14,170,000	1847,	"	40,814,000

CHEESE AND BUTTER.

The following are a part of the exportations of cheese from the state of Ohio:

Trumbull, pounds,	4,000,000
Portage,	2,000,000
Geauga,	250,000
Madison,	200,000
Ashtabula,	5,000,000
Five counties,	11,450,000

It appears, then, that the state must export at least twelve millions of pounds of cheese; probably much more.

Of butter, the counties engaged in exporting are much more numerous. The following are part:

Carroll, pounds,	75,000
Crawford,	200,000
Geauga,	50,000
Harrison,	250,000
Hancock,	35,000
Huron,	100,000
Muskingum,	200,000
Morgan,	20,000
Trumbull,	160,000
Nine counties,	1,020,000

The exports of the state is probably about four millions of pounds. The dairy products of Ohio are, therefore, very large.

From the Cincinnati Daily Atlas.

MOVEMENTS OF PORK, BACON AND LARD, FOR TWO SEASONS.

We present below several tabular statements, showing the movements last season and this, towards the southern Atlantic outlet, of three leading articles of provisions. Following these, will be found a table of the movement beyond that outlet, for the two seasons, of the same articles. The movements into and from Cincinnati, are from 1st September, 1847, to 1st February, 1848. The movements into and from New Orleans, from 1st September, 1847, to 22d January, 1848.

	1846—'47.	1847—'48.
Into Cincinnati.		
Pork and bacon, hogsheads,	2,051	421
Tierces,	3	36
Barrels,	16,538	22,621
Pounds,	581,522	966,587
Lard, barrels,	10,524	15,660
Lard, kegs,	8,939	23,820
From Cincinnati.		
Pork and bacon, hogsheads,	8,388	14,719
Tierces,	2,758	5,017
Barrels,	87,337	87,042
Pounds,	868,355	1,460,049
Lard, barrels,	30,047	41,923
Lard, kegs,	78,516	124,939
Into New Orleans.		
Pork, hogsheads,	3,023	5,764
Barrels,	87,664	110,302
Pounds,	764,000	1,008,976
Bacon, hogsheads and casks,	13,901	7,004
Barrels and boxes,	2,628	3,817
Pounds, bulk,	235,952	24,540
Lard, tierces and barrels,	41,985	47,711
Lard, kegs,	125,626	144,869
From New Orleans.		
Pork, barrels,	70,115	74,481
Bacon, hogsheads,	8,761	8,432
Lard, kegs,	235,085	222,311

These statements make apparent two or three facts, which are worthy of notice. The first is, that the manufactures of the hog are this season moving forward from the producing towards the consuming regions, earlier than usual; the second, that they have begun to stop short of their destination, and are accumulating midway, for want of a market. For example:

1. There have been shipped from Cincinnati this season, (from September 1st to 1st February,) 273,640 packages of pork, bacon and lard, against 207,046 packages last season.

2. There have been received at New Orleans this season, (1st September to 22d January,) of same articles, 320,665 packages, against 274,827 packages last season.

3. There were shipped from New Orleans last season, (for same period,) 313,961 packages of same, against 305,584 packages, that have been shipped this season.

This shows an accumulation at New Orleans, in something less than five months, of 54,215 packages lard, pork and bacon, (exclusive of bulk,) above the accumulation last season for the same period.

In reference to the three articles specified, taken separately, the accumu lation is as follows:—of bacon, 4,177 packages *less* than during the same period last season; of pork, 20,653 packages *more* than last season; (and this notwithstanding an excess of shipments from New Orleans this season over last, for the time named, of 4,726 barrels,) of lard, 37,743 packages more than last season.

PORK PACKING IN THE WEST.

Mr. Cist, in his Daily Advertiser, says: I complete this day, my statistics of pork packing for 1847–'48.

Virginia—Wheeling,	5,000
Kentucky—Louisville,	97,200
Maysville,	11,000
Covington,	6,000
Tennessee,	100,000
Indiana—Wabash points,	162,641
White river do	29,000
Madison,	75,000
Aurora,	10,000
Illinois—Quincy,	20,000
Alton,	30,500
Other points on or near the Mississippi,	43,000
Illinois river points,	121,000
Missouri—St. Louis,	63,924
Hannibal,	20,000
Lexington,	6,009
Missouri river points,	37,900
Iowa—Bloomington,	10,000
Fort Madison,	10,000
Burlington,	15,000
Ohio—Chilicothe and other points on Scioto,	80,000
Warren county,	30,100
Clinton county,	17,200
Brown county,	17,824
Cincinnati and vicinity,	488,160
	1,506,458

The editor of the St. Louis Republican estimates the year's packing in the west at 1,492,924 hogs. The difference between us, which is not more than 14,000 hogs, is more than made up in this state's packing operations, not included in his statements.

When it becomes evident that the packing here would approach half a million, it was generally supposed that the entire packing of the west would reach 2,000,000 hogs—Cincinnati usually packing one-fourth the entire quantity put up in the west. It is now, however, probable that what I have hitherto set down for the entire putting up of the west for 1847–'8 as not exceeding a million and a half of hogs was correct.

ILLINOIS.—PORK PACKING AT CHICAGO

The Chicago Journal gives the following statement of the number of hogs packed at that point during the winter of 1847, which it vouches for as being nearly correct. There have been taken in and packed—26,682 hogs, making 12,169, barrels of mess pork. The hams and shoulders make about as much more. There has been a great increase in the number of hogs that have been packed this season, over that of the previous one. The quality of pork is said to be very fine, and the average weight of hogs much exceed that ever before offered in the same market. Prices having ranged during the season from $1 75 to $3 25.

From the Cincinnati Chronicle.

THE WOOL TRADE OF OHIO.

In regard to sheep, the following are some of the statistics of wool exports in Ohio.

Exports of Wool from Ohio.

	1845.	1846.	1847.
Cleveland,	961,174	971,199	1,442,951
Portsmouth,	140,278	213,780	48,696
Harmar,	107,462	82,893	233,911
Toledo,	56,204	80,150	146,437
Cincinnati,	250,000	300,000	300,000
Total,	1,515,118	1,548,022	2,271,995

If we add to this, the ports of Sandusky, Huron, and others, with the amount sent to Pittsburg, by the Pennsylvania and Ohio canals, we shall have at least three millions of pounds, as the aggregate, and an increase in 1847, of thirty per cent. on the former exports.

The prices have in Ohio, varied from twenty to thirty-two cents per pound, according to quality. The average price in Cincinnati has been bout twenty-five cents per pound.

The total increase of sheep of the state, is nearly	70 per cent.
Number in 1847,	2,028,401
" 1848,	3,365,028
Increase	1,336,627

The statement of capital and profit may be thus given:

Value of land,	$5,000,000
Value of sheep,	2,000,000
Capital employed,	$7,000,000
Value of wool exported,	750,000
Nett profit on capital,	10 per cent.

This is independent of all expenses, labor and taxes. It is a good profit on agricultural capital.

WOOL.

The arrivals of wool by the canal at tide water have been as follows during the last four years:

Year.	Pounds.	Value.
1844	10,182,000	$3,424,015
1845	12,142,000	3,751,002
1846	10,574,000	2,829,796
1847 to November 30	11,221,384	3,336,407

N. B. We had prepared a variety of other tables containing much interesting information relating to the domestic trade of the United States, which we are, however, compelled to omit for want of room, as it was impossible to calculate accurately for the tables to be printed.

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ERRATA.

Page 116, line 13 from top, for No. 2, read No. 16.

Page 247, line 15 from bottom, for 14 cwt. read "1400 cwt."

Page 271, line 9 " " erase "figure 1, plate 1," and insert it after *strands* in line 4th from bottom. Figure 1 represents a *strand*, not a *staple.*

Page 297, line 7 from top, for "to buy clippings through the dust and heat," read "to buy clippings in an unwashed state."

Page 317, line 10 from top, for "Ober" read "Oder."

Page 323, line 8 from bottom, for *Volkfesta* read *Volksfeste.*

Page 327, line 6 " " erase "planted."

Page 329, line 18 " " for "and" read "because."

Page 332, line 4 from top, after "acres" insert "to a farm."

Page 334, line 21 " " after "your" insert "wheat in."

Page 338, line 10 " bottom, for "water of" read "draining from."

Page 339, line 17 from top, for "all the roots," read "all the suckers."

Page " line 19 " " for "to the top" read "first the top."

Page " line 20 " " for "shoot out open," read "appear again."

Page " line 18 " bottom, before "by planting" insert "which can be effected."

Page 339, line 12 from bottom, for "brown," read "yellow."

Page 340, line 21 from top, erase "and in different ways."

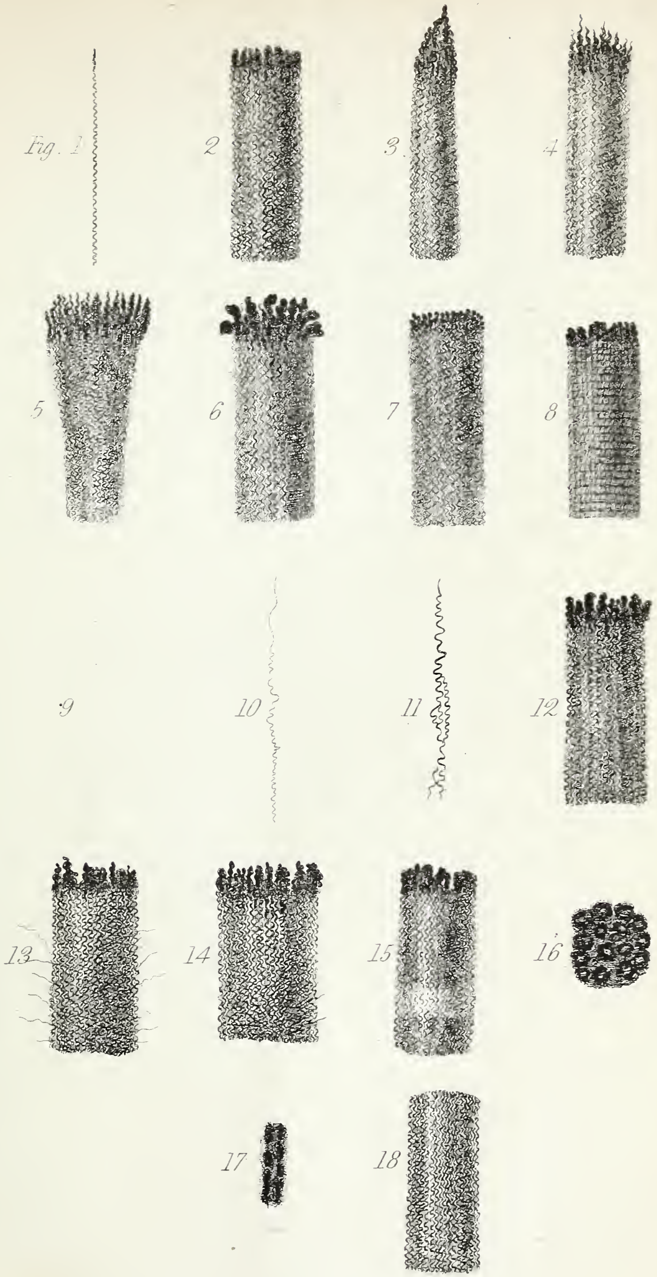
Page " line 5 from bottom for "quintares" read "quintales."

Page 341, line 2 from top " " " "

Page 343, line 15 from bottom, for "plastered" read "paved "

Woolstaples

Plate I.



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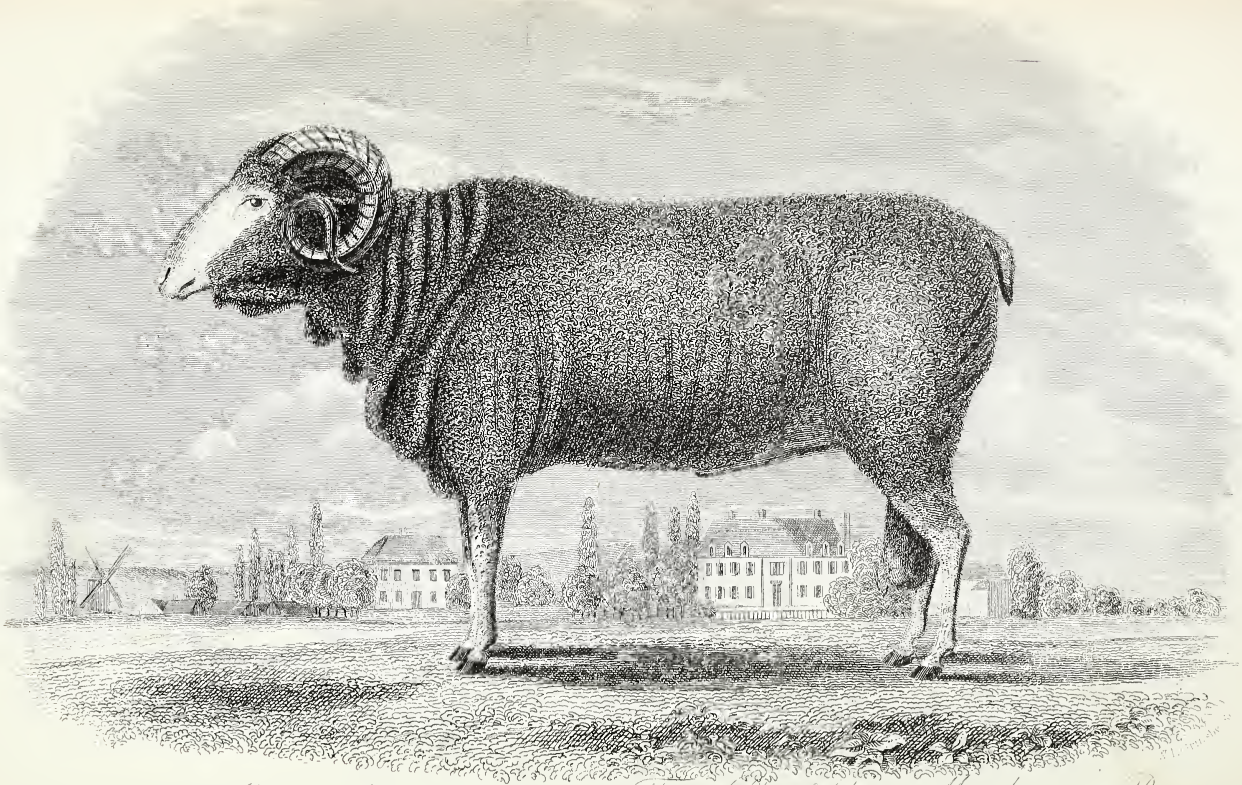

Fig. 30 Electoral Escurial Buck No. 177 of von Thaer's Sheepfold at Moeglin in Prussia

With a view of the Royal agricultural School of Moeglin

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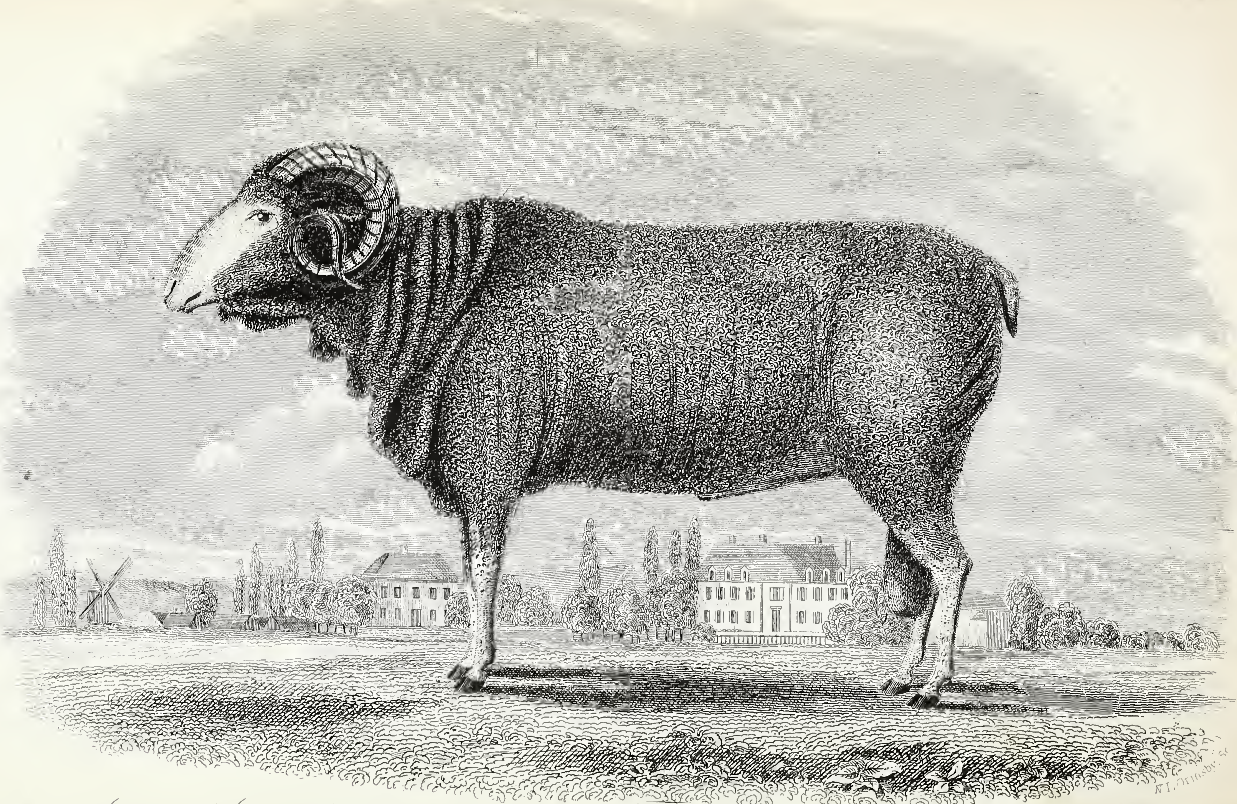

Fig 10. Electoral Escurial Buck No. 177. of von Thaer's Sheepfold at Moeglin in Prussia.
With a view of the Royal agricultural School of Moeglin.

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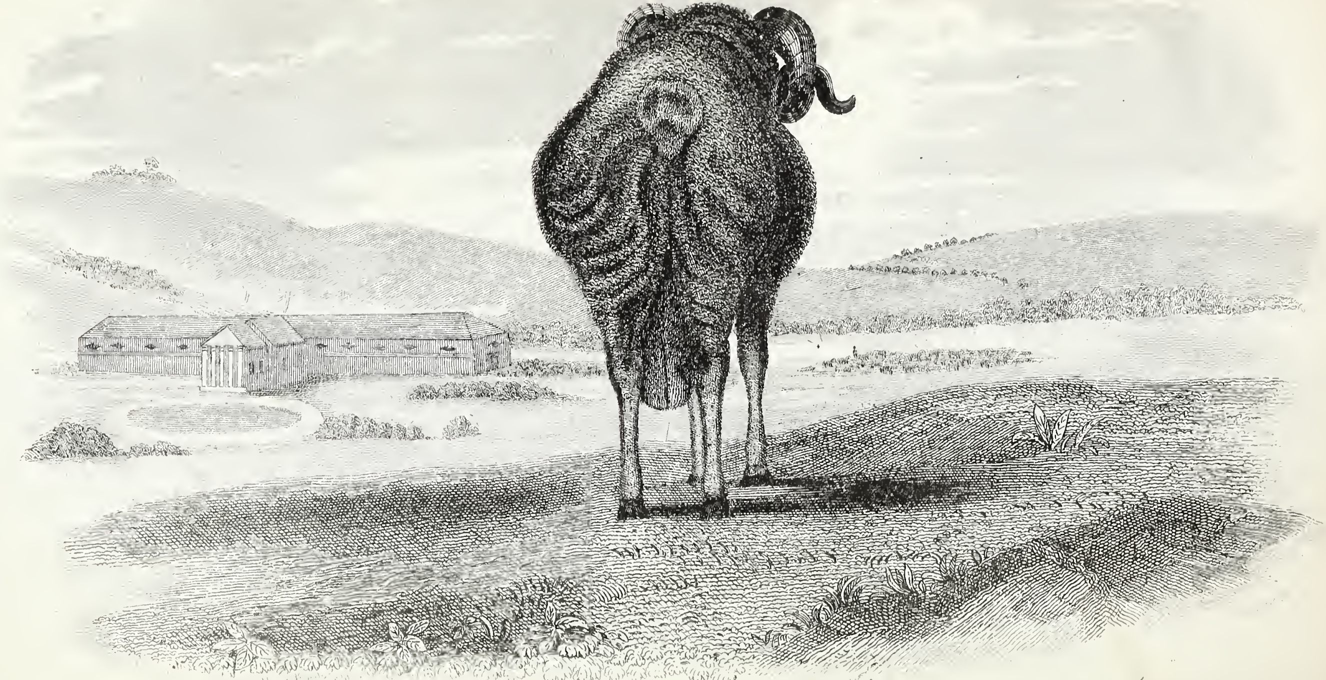

Fig. 20. Back view of the Electoral Escurial Buck N.º 177 represented in Fig. 19.

With a view of the Sheepstable at Marienthal near Alesuth in Hungary Estate of the Vice Roy of Hungary

DRAWN FROM NATURE BY CH. L. FLEISCHMANN

FOR THE U. S. PATENT OFFICE.

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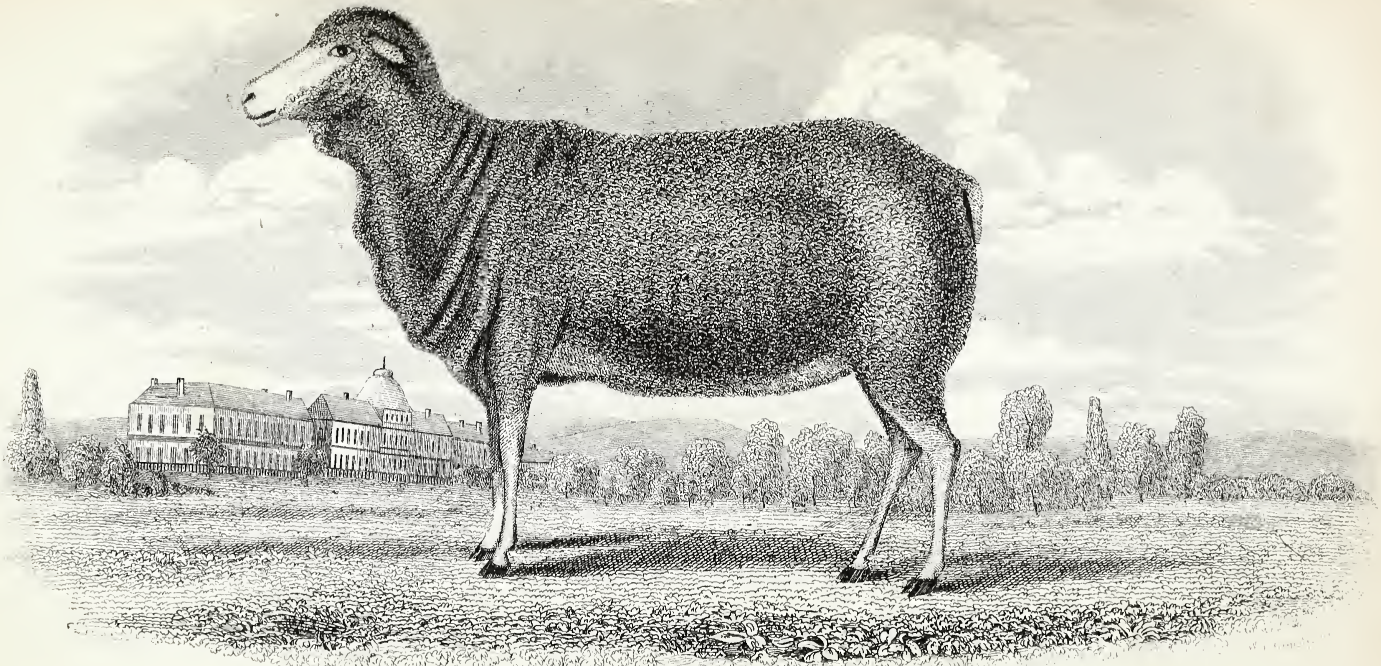

Fig 21 Electoral Escurial Ewe of von Thaer's Sheepfold

With a view of the Royal agricultural School at Hohenheim in Wirtemberg

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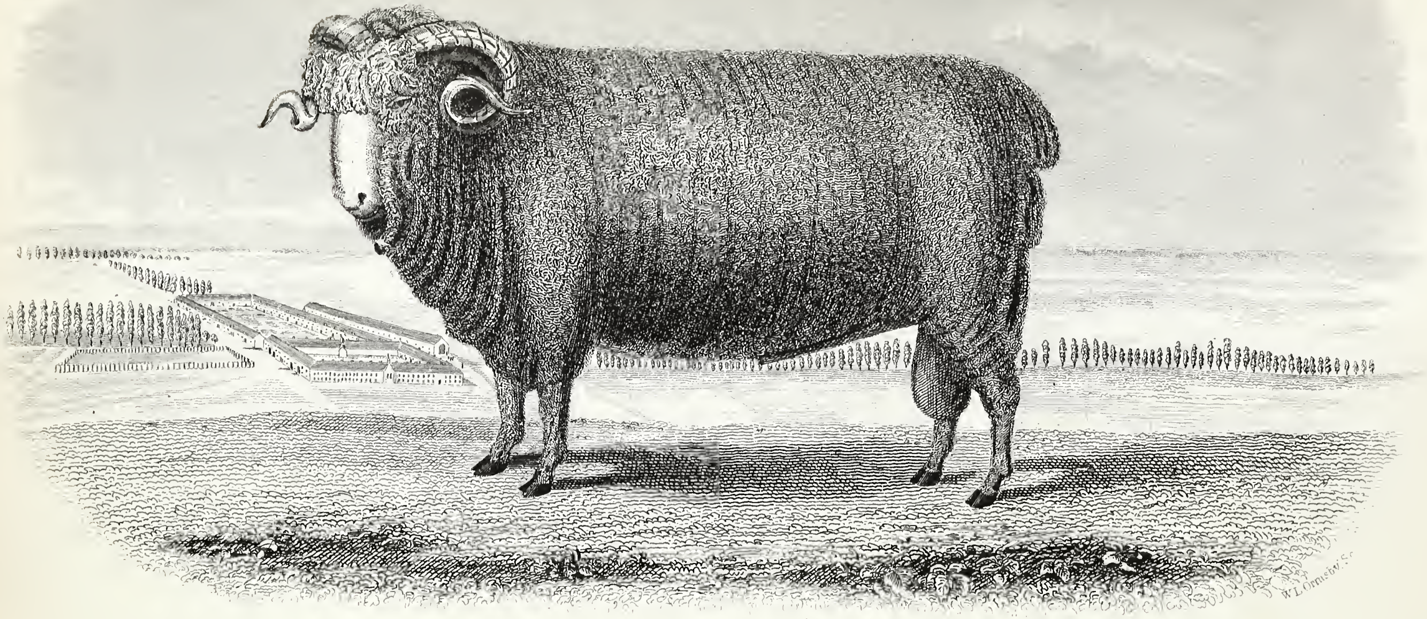

Fig 22. Infantado Negretti Buck, from the Sheepfold at Hoschtitz in Moravia

With a view of the Royal agricultural School & Model Farm at Schleissheim, in Bavaria

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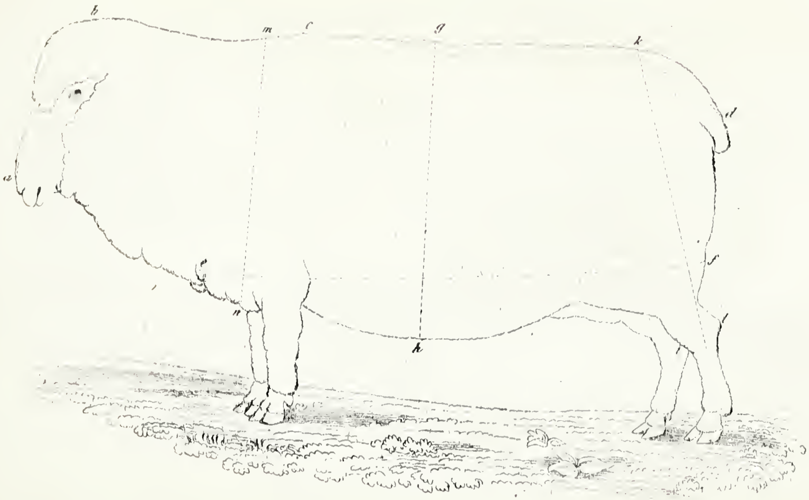

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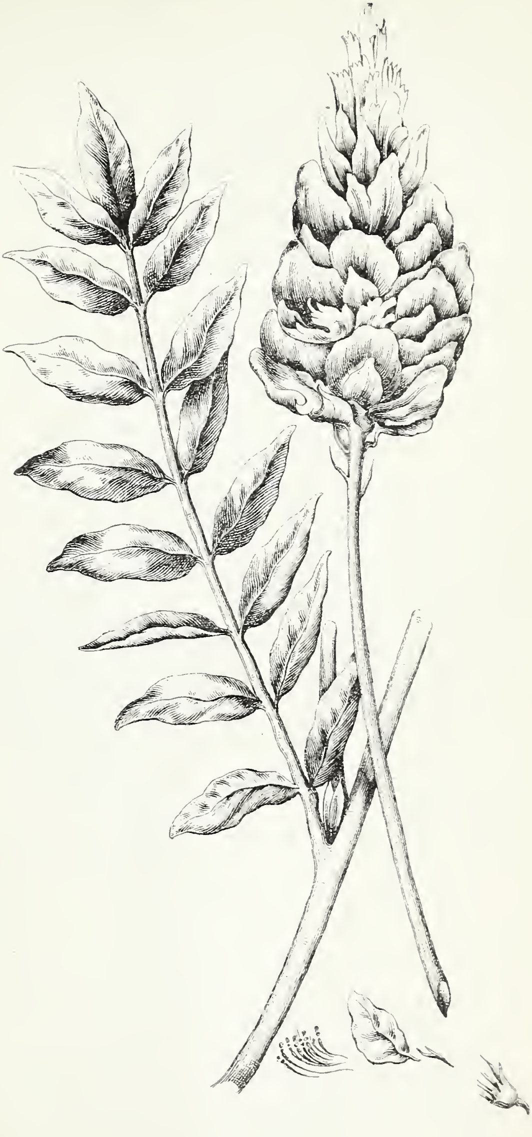

Fig. 51. Hedysarum Onobrychis.
Saintfoin.

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Plate VIII.

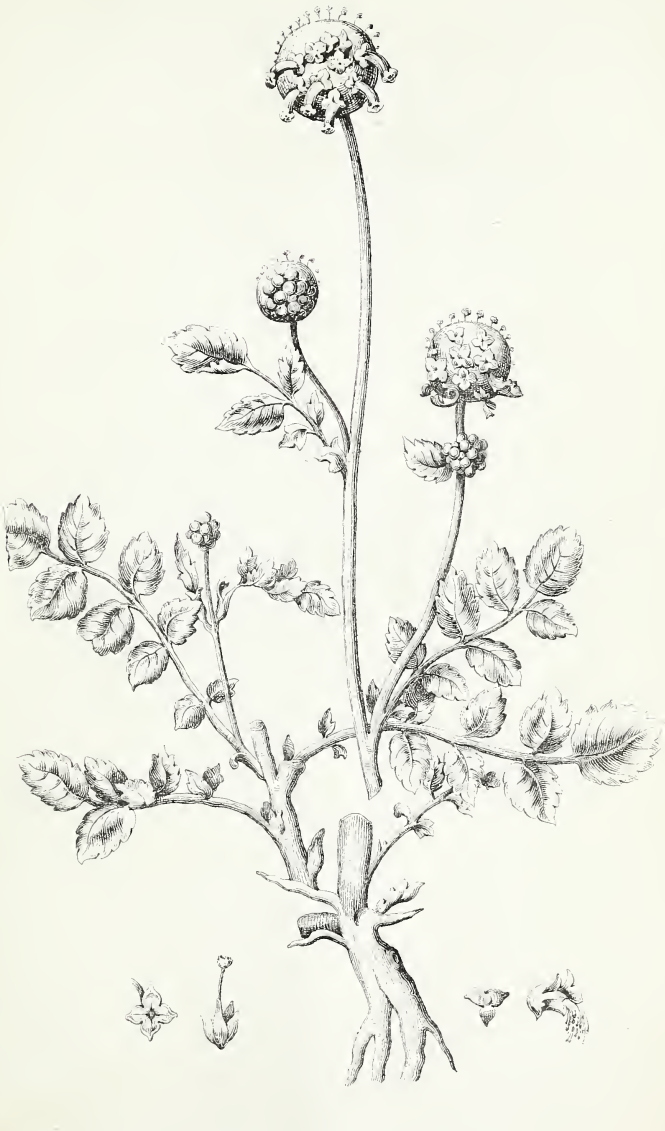

Fig. 52. Poterium Sanguisorba.

Pimpinell.

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